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by the cleavage planes. Between these plates of granite lie plates of unchanged dark blue sandstone; a rock which at the cascades (two miles from the house in another direction) has been mistaken for greenstone trap. The successive terraces and cliffs of the mountain are evidently the consequences of this horizontal and alternate structure. As in other horizontal mountain plateaus the terraces here are projected between the ravines in the form of noses, with straight crests, and terraced or stepped at their ends. In fact, to a practised topographical eye, the aspect of the whole White Mountain range is that of synclinal erosion.

Other considerations reinforce this opinion. The continuation and broadening of the range north-eastward through Maine and Lower Canada, where supersilurian rocks abound,—the termination of the range south-eastward before reaching Massachusetts and Vermont, as the Alleghany synclinal stops at Catts-kill before crossing the Hudson,—the presence of horizontal rocks at Worcester and more generally than would be supposed through middle New England—the fact that the Connecticut Valley runs everywhere under the western escarpment of the White Mountains, separating it from the silurian range of the Green Mountains,—and the presence of Potsdam and other low formations in eastern Massachusetts,—all these facts would find their explanation in a synclinal terminal eroded structure of the White Mountain mass.

The granite of Mount Osceola and the surrounding heights consists of large crystals of feldspar, smaller crystals of quartz and smaller flakes of mica. Here and there hornblende appears. The rock bears no resemblance to the subsilurian Highland and Blue Ridge range, and Adirondacks. It is friable under the weather, shedding its crystals upon the ground under every overhanging ledge. The boulders are rounded by the weather action apparently more than by movement; for they have only travelled down the slopes beneath the cliffs from which they have fallen, and where those that remain are sharp-angled. The peculiar gravel and sand of the Mad River Valley is a local drift of similar origin. The metamorphism of these granites is considered by Logan, Hunt, and others, as no longer disputable. They could easily originate in the clayey sandstones of Formations VIII., IX. and X., of the Appalachians.

Considering the whole White Mountain mass a synclinal plateau, then the summit of Mount Washington, which is such an acknowledged anomaly, becomes regularly the single residual fragment of the highest formation which escaped erosion. Its rock is so different in texture and structure from the rest of the mountains that no other explanation seems possible; and if this hypothesis be adopted, there is no longer any need of that which supposes the submergence of New England *up to the base* of the head of Mt. Washington *and no higher*, leaving the head in the air to escape the general rounding and polishing action. It becomes easy to consider the external difference due rather to the difference of the rock formations above and below that horizon.

It is to be hoped that a systematic explanation will be made of this interesting region and the structure made out and mapped, so that we may arrive at conclusions, instead of venturing conjectures.

September 25th.

Vice President BRIDGES in the Chair.

Thirty six members present.

The Committee on the paper of Mr. John Cassin, "Descriptions of New Birds from Western Africa in the Museum of the Academy of Natural Sciences," reported in favor of its publication in the journal of the Academy.

On report of the respective Committees, the following papers were ordered to be published in the Proceedings:

[Sept.

**Description of a new species of *Astroscopus*, Brev., in the Museum of the
Academy of Natural Sciences of Philadelphia.**

BY CHARLES C. ABBOTT.

Astroscopus guttatus Abbott. Plate VII.

Spec. Char.—Body depressed anteriorly. Head flattened above. Two sub-quadrangular depressions posterior to the orbits. Eyes prominent, situated in circular depressions, and five and a half diameters distant. The base of the two dorsals equals in length the distance from the anterior insertion of the first dorsal to the extremity of the upper jaw. Opercular apparatus large, the branchial aperture unusually wide; the opercle marked with distinct radiating striæ, and margined below with a smooth, thick and semi-transparent membrane, which extends beyond the insertion of the pectoral fin. The insertion of the ventral fins is opposite the margin of the preopercle and greatly anterior to the insertion of the pectorals. The insertion of the anal fin is slightly posterior to the anterior insertion of the second dorsal, and extends nearer the base of the caudal than that fin.

D, 4—14. V, 5. P, 16. A, 13. C, $12\frac{2}{2}$

Color.—In the alcoholic specimen. Back, upper portion of the cheeks, upper part of cranium, and upper jaw, bright chocolate; lighter on the head than body, and the depressions on the upper surface of the head very pale. Belly and throat pure white. The chocolate tinted surfaces are minutely covered with numerous circular spots or guttæ, of the same tint, but several shades lighter. The membrane of the first dorsal black; and the second dorsal has three irregular bands of dull black, obliquely across it. The caudal with three parallel bands of blackish-brown, the middle of which appears to be the continuation of a variable longitudinal band on the centre of each side. The anal has a variable band of dull brown, darker upon the posterior termination.

Locality.—Cape May, New Jersey. Beesley's Point?

Description of a new species of *Chatoessus*, Cuv., from New Jersey.

BY CHARLES C. ABBOTT.

Chatoessus insociabilis Abbott.

Spec. Char.—Body compressed, sub-elliptical; dorsal outline greatly arched anteriorly to the dorsal fin, slightly and obliquely curved posteriorly. Ventral outline regularly curved from posterior insertion of the anal fin to the throat. Abdomen compressed, carinate and serrated. The head is very small; the breadth anterior to the angle of the opercle six-sevenths of the length from occiput to the extremity of the snout. Snout globose; upper lip fleshy, longer than the lower, which is membraneous. The angle of the jaws in a line with the centre of the orbits. Margin of opercle membraneous, coarsely serrated; margin of preopercle, membraneous and circular.

Dorsal fin quadrangular, the posterior ray prolonged; pectoral fin rounded, reaching beyond the base of the ventral fin; ventral fin equal in width to its length and reaching a slight distance beyond the posterior insertion of the dorsal fin; caudal fin forked. The number of the fin rays are,

D, 14. P, 16. V, 8. A, 32. C, 28, sometimes 29.

Color.—Back and upper third of the sides deep green, with a bluish cast in particular lights; lower two-thirds of the sides and the belly pure white. The deep green above and white beneath, meet abruptly, and do not blend to-1860.]

gether, except on the peduncle of the tail. The fins partake of the color of the region to which they belong, and exhibit irregularly shaped spots on each. These markings on the fins are very variable, and in some specimens are wanting. A very deep glossy black circular spot, above the angle of the opercle, marks the beginning of the lateral line, which is only apparent on a very careful examination. Total length, 15 inches; greatest width, $5\frac{1}{2}$ inches.

This species is possessed of a gizzard similar to that of *C. ellipticus Kirtland*; to which species this bears considerable resemblance, yet is very distinct in its general form, color and habits.

The specimens of this fish, from which the description was taken, I procured in a secluded and very deep sheet of water, known as the "Sturgeon Pond," situated two miles below Trenton, N. J. The following items of its habits were collected from reliable fishermen and by my own observation. This fish is remarkably gregarious, and is never seen associating with any other than its own species; it is a lover of deep and still water, seldom rising to the surface, and appears very averse to the bright light of the sun. If driven into a stream of water with considerable current, they immediately show signs of uneasiness, and, if not soon liberated, die. Two localities only I am acquainted with that abound with this species, and both are deep small lakes formed by the junction of several small streams, and never in these streams has the fish been discovered, except when driven into them by the fishermen. As an article of food they are entirely worthless; yet they afford much sport to juvenile anglers, by the rapidity with which they may be taken, with a trout-fly, or common angling worm.

Descriptions of new Cretaceous Corals from New Jersey.

BY WM. M. GABB AND GEO. H. HORN.

Hippothoa irregularis.—Colony spreading, on shells, forming straight, or but slightly curved lines; branching nearly at right angles, though generally from but one side of the cell. Cells oval, flattened, placed closely together, united by a stout pedicle. Opening nearly central, with its greatest diameter in the direction of the length of the cell, often with an ovarian vesicle at the distal extremity.

The shape of the cell of this species relates it nearly to the *H. simplex D'Orb.*

Cellepora bilabiata.—Colony encrusting, generally in elongate patches. Cells in lines arranged in an irregular quincunx, convex. Opening, viewed from above, nearly circular. The cell walls above and below the mouth project, forming two labiate processes.

Cellepora carinata.—Colony encrusting. Cells in quincunx. Walls of cells meeting anteriorly, forming a carina, whose apex projects forward, and toward the oral opening, apex often perforated. Carina diminishing as it approaches the cell below.

Cellepora typica.—Colony encrusting, in large patches. Cells arranged in radiating lines, usually in quincunx, irregular exteriorly, small, rhomboidal, spaces between oral openings wide, perforated by numerous large accessory foramina.

This specimen was found encrusting a *Terebratula Harlani*, to which was also attached an *Ostrea panda*, both being typical specimens.

Reticulipora sagena.—Colony large (about one inch in diameter), formed of plates, lateral plates not numerous, given off rectangularly; summit of plates perforated by cells, and thicker than the rest of the plate; lateral openings triangular, without any marked arrangement.

Resembles the *R. obliqua*.

[Sept.

Reptomulticava cepularis.

Alveolites cepularis (?) S. G. Morton, Cretaceous.

Colony irregular, nodulated, with a tendency to an irregular pyramidal outline. Cells elongated, hexagonal, large.

This is probably the species named by Morton, but as no description or figure was given, it cannot be certainly stated.

Multirescens parvicella.—Colony large, anastomosing in the manner of *Rhipidigorgia flabellum*. Cells small, resembling those of *M. lanata* D'Orb. Cellules wanting.

NOTE.—Figures of the above species will be given in the next number of the Journal of the Academy.

On Milne-Edwards' Synonymy of *Xiphigorgia setacea*.

BY GEO. H. HORN.

My attention was directed to the above, by finding the polypidom, called by Dana "*Gorgonia* (*Pterogorgia*) *setacea*," classed with the "*X. setacea*" of M. Edwards, who considers them synonymous.

The "*X. setacea*" of Edwards is thus described:—

"Polypéroïde en forme de rubans très-étroits, flexueux et très-longs, mais sans vestige de ramifications. Coenenchyme jaune; verrues calicifères arrondies, de couleur rose, et formant, de chaque côté, une bordure saillante.

Hab.—Mers d'Amérique."

Pallas' original description is—

"*Gorgonia*, simplex, rigida, cortice calcareo albo subverrucosa.

Locus.—Mare Americanum."

Dana subsequently amplified the above description, rendering it more explicit.

"*Gorgonia* (*Pterogorgia*) *setacea*. Whitish, simple, rigid, rarely with a single branch; surface subverruculose; verruculae minute (one-third of a line), and obsolete, numerous and crowded, mostly on two opposite sides, with a narrow, naked interval between.

Laguayra.—Z. Collins."

The latter description was derived from a specimen in the Academy's Museum, and does not resemble either the description or figure of Milne-Edwards.

The "*X. setacea*," as described and figured by Milne-Edwards, agrees in every important respect with the "*Gorgonia juncea*" of Pallas and subsequent authors.

"*G. simplicissima*, attenuata, subflexuosa, cortice crasso, rubro verrucoso." Pallas, 1766.

"*G. simplicissima*, teres, utrinque, attenuata, osse corneo fusco, carne ochracea bisulcata, oculis crebris linearibus notata." Ellis, 1786.

"*G. simplicissima*, longissima, teres; carne ochracea subminiata; oculis, crebris sparsis subgranulatis." Lamarck, 1816.

From the above descriptions, we conclude, that the species described by Milne-Edwards as "*setacea*," is none other than the "*juncea*" of older authors.

Pterogorgia simplex described by Valenciennes, in *Comptes Rendus*, xli. (pp. 10, et 13), differs from either the "*setacea*" or "*juncea*" in the form of its "verruës calicifères."

The true disposition of these polypidoms appears to be as follows:—
1860.]

Xiphigorgia juncea Horn.*Gorgonia juncea* Pallas, Elench. Zoop. 1766, p. 180.

Ellis, Nat. Hist. Zooph. 1786, p. 81.

Lamarek, Anim. Sans. Vert. 1816, p. 320.

Lamouroux, Polyp. Flex. 1816, p. 419.

Dana, Zoop. U. S. Exp. 1848, p. 664.

Xiphigorgia setacea Edwards, Coralliaires, 1857, p. 172.*Xiphigorgia setacea* Horn.*Gorgonia setacea* Pallas op. cit. p. 182.

Lamouroux, op. cit. p. 421.

Lamarek, op. cit. Deux. Edit. ii. p. 502.

Pterogorgia setacea Dana, op. cit. p. 653.*Xiphigorgia simplex* Horn.*Pterogorgia simplex* Gorg. Comptes Rendus, xli. p. 13.

Descriptions of Reptiles from Tropical America and Asia.

BY E. D. COPE.

SIDEROLAMPRUS Cope.

Scales smooth, toes 5—5. Palatine teeth none. Lower eyelid covered with large scales. Nostril in the centre of an elongate nasal plate. Two pairs of supranasals, contiguous. Internasal present, fronto-nasals absent. Frontal in contact with the interparietal, thus separating the fronto-parietals. Parietals small, widely separated by the broad occipital. Tail cylindrical.

This genus of scinks is most nearly allied to *Eumeces* and *Otosaurus*, but may be distinguished by the presence of two pairs of supranasals, and absence of fronto-nasal.

S. ENNEAGRAMMUS Cope.

Vertical plate elongate, broadest posteriorly, the lateral borders very concave. Palpebral plates five. Tail longer than the head and body. Color above glossy black, shading into ultramarine blue about the middle of the tail. A delicate line of the latter color occupies the centre of each of the central nine rows of dorsal scales. These are all discontinued upon the occiput, except the external one upon each side, which passes round the side of the head and meets its fellow upon the muzzle. The palpebral and supranasal plates are suffused with blue, and delicately bordered with black. Beneath dirty white, shaded with blue upon the abdomen and tail. Length of head and body to vent, 15 lines; of tail (mutilated) 16 lines.

This beautiful little scink was discovered by Sr. Rafael M. De Oca, in the vicinity of Jalapa, Mexico, and obtained for the Academy by Dr. Thomas B. Wilson.

TROPIDONOTUS COMPSOLEMUS Cope.

Scales in nineteen longitudinal rows, all keeled. Head distinct, short, deep: profile anteriorly descending. Rostral plate twice as broad as high. Pre-frontals subtriangular; loreal longer than high. One rather narrow preocular; postoculars three, the lowest very small. Vertical and superciliaries elongate; lateral borders of the former scarcely converging; the latter narrow. Superior labials eight, fourth and fifth entering the orbit. Inferior labials nine. Tail slender, slightly compressed at the base, three-tenths of the total length. Gastrosteiges 126; a divided anal; urosteiges 67. Total length 16 inches; of tail 3 in. 6 lin.

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Coloration. Above blackish brown, darkest anteriorly. Very indistinct, pale transverse bands are apparent. They are irregularly oblique, and separated by intervals of two or three scales wide. Superior and inferior labials more or less completely margined anteriorly with yellow; genial and gular plates spotted irregularly with the same. General color beneath a peculiar stone brown. A darker shade occupies the centres of the gastrosteges as far as the vent. This is almost excluded anteriorly by a central series of transversely elliptical yellow spots, one near the anterior border of each gastrosteg. These become narrower, and broken, and upon the posterior two-thirds of the belly are almost lost. There is a very indistinct row of smaller spots upon each side of it anteriorly.

Habitat.? Key West. Mus. Comparative Zoology, Cambridge.

This species should be compared with *T. sipedon*, *T. celaeo* and *T. validus*. It differs from the first in the number of rows of scales, and from all three in the form of the muzzle and coloration of the lower surface.

THAMNOPHIS SCALARIS Cope.

Head narrow, elevated, the profile sloping in front, muzzle obtuse. General form moderately slender, the tail a little less than one fourth the total length. Superciliary and vertical plates elongate, the lateral borders of the latter straight and convergent. Occipitals elongate. Loreal plate higher than long; one pre-, three postoculars. Superior labials eight, fourth and fifth entering the orbit. Inferior labials ten. Anterior genials longer than posterior. Scales in nineteen rows, not emarginate, the external smooth. Gastrosteges 143; an entire anal; urosteges 59 pair.

Coloration. Beneath, and upon the first row of scales, dark, ashy olivaceous, the latter frequently black at their bases. Second and half the third row of scales a little paler. The vertebral, and the borders of one row on each side of it, yellowish. The color of the remainder of the upper surface is brown, anteriorly shaded with olivaceous. This is crossed from the lateral to the dorsal stripe, on each side, by vertical bars, black, or deep brown bordered with black, numbering from the head to the origin of the tail, about sixty. There is a pair of large spots just behind the occipital plates, and one involving the temporals and the whole of the occipitals, its anterior border trilobate and produced upon the vertical and superciliaries. A short yellowish vitta extending from the posterior angle of the former plate along the occipital suture, represents a confluent pair of occipital spots.

Habitat. Jalapa, Mexico, found by Sr. R. M. De Oca. Mus. Academy. Presented by Thos. B. Wilson, M. D.

ARIZONA JANI Cope.

Head not very distinct, tapering. Rostral plate rounded, presenting an obtuse angle between the prefrontals. Post-frontals bent upon the sides of the head. Vertical longer than broad, the lateral borders much converging, posterior angle obtuse. Occipitals longer than vertical, subdivided as in *Pityophis* sp. Nostril between the nasals; loreal plate longer than high. One preocular not reaching the vertical, three postoculars. Superior labials eight, fourth and fifth entering the orbit, inferior labials twelve, sixth largest. Post-genials shorter than pre-genials. Scales of the body in twenty-seven or nine rows, the central thirteen keeled. Tail short.

Coloration. Above, a pale yellowish brown, browner on the crown and muzzle. A series of quadrate dorsal spots extends throughout the whole length, involving from thirteen to seventeen medial rows. Anteriorly they are separated by spaces eight scales wide, but these intervals diminish posteriorly. There is a lateral series of spots which alternate with those of the dorsal row, and are sometimes confluent with others, which form a series along the tips of the gastrosteges posteriorly. Anteriorly the dorsal intervals are divided by a transverse series of three small spots, which are probably sometimes confluent. These markings are all black anteriorly; posteriorly, they are shaded with 1860.]

brown. Belly dirty yellowish. The length and number of gastrosteges of our specimen cannot be given, owing to its mutilated condition. Urosteges 58, the tail terminating in a rather long corneous appendage.

Habitat. Buena Vista, Mexico. Lieut. Couch. Mus. Smithsonian.

This genus is intermediate in structure between Rhinechis "Coluber" *Gthr.* and Pityophis. It has not the four postfrontals of the last, nor the divided anal shield of the first two. In form, the rostral plate is intermediate between those of "Coluber" and Pityophis. The present species is nearly allied to the *A. pleurosticta* Cope, (*Elaphis pleurostictus* Dum. & Bibr.) of Uruguay. Named in honor of Prof. Jan, of Milan, a distinguished herpetologist.

DROMICUS TEMPORALIS Cope.

Scales in seventeen longitudinal rows. Head distinct, eyes small, anterior; muzzle short. Mouth very inferior. Rostral plate prominent, but barely visible from above: prefrontals small: vertical broad, presenting an obtuse angle anteriorly, one less than a right angle posteriorly, the superciliary borders nearly parallel. Occipitals well developed, each bounded by three large, and two small temporals. Postnasal vertical, crescentic; loreal confluent with the preocular, (probably not a constant character); postoculars two on one side, one on the other. Superior labials seven, third and fourth entering the orbit. Inferior labials eight, fifth largest, seventh twice the size of the sixth. genaeal pairs equal. Gastrosteges 167, a divided anal; (tail mutilated). Length of head and body seventeen inches.

Coloration. Above, chocolate brown. A narrow yellow band with a broad blackish superior border extends from the throat to the vent, along the suture of the first and second rows of scales. The greater part of the first row, and the ends of the gastrosteges are involved in a blackish plumbeous band which extends from the throat to the vent: the central third of each scale of the fifth row on each side is brownish-yellow, the upper and lower thirds blackish; thus is formed a narrow black-edged band, which extends from the throat to the end of the tail. A yellow band extends from the superior border of the first upper labial, crosses the lower halves of the posterior labials, and widening, extends upwards upon the temples and neck, forming apparently the rudiments of a collar. Throat and belly saffron yellow.

Habitat. Probably Cuba.

Mus. Comparative Zoology, Cambridge, Mass.

AMASTRIDIDIUM Cope.

Body cylindrical, elongate; tail moderate, slender. Head distinct, broad, short, tapering rather abruptly. Superior maxillary teeth in a continuous series, the last abruptly the longest, not grooved. Pupil round. Top of head flat, separated on the muzzle from the sides, by an angle. Superciliaries prominent. One anterior, two postoculars. Loreal none. Nasals large, one or two, the nostril situated in the centre of the anterior. Scales on the posterior parts of the body, slightly keeled. Anal and subcaudal scutella divided.

This genus differs from *Coronella* Laur. in the short, depressed, angular head, and the absence of the loreal plate. The form of the head somewhat resembles *Xenodon*, but the form of the body, the plating and dentition, are different.

A. VELIFERUM Cope.

Scales in seventeen longitudinal rows, smooth on the anterior half of the body: posteriorly a few dorsal rows with faint keels, becoming stronger toward the tail, and extending on all the scales near the anal region. Here they are tuberculous, as in *Aspidura trachyrocta nobis*. Tail nearly one-third the total length. Occipital plates large, almost reaching the labials in front, posteriorly acuminate; vertical long, acute behind; superciliaries large, promi-

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uent, broad behind. Postfrontals small, their anterior outline regularly curved; prefrontals small, quadrangular. Rostral nearly rectangular, not appearing on the surface of the head. Postnasal high, its apex visible from above, opposite the suture between the pre- and postfrontals. Superior labials seven, eye resting on third and fourth. Inferior labials nine. Geniæ two pair, the anterior shorter.

Total length 14 in. 11 lin. tail 4 in. 10 l. Gastrosteges 127, urosteges 85.

Coloration. Above and below, reddish-brown, paler in the centres of the gastrosteges. Every fourth scale of the fifth row on each side, pale, the adjacent scales on the fourth and sixth rows, generally darker. Top of the head much lighter, varied anteriorly; palest behind the eye and above the labials. The latter are dark with a few light spots.

Habitat. Cocuyas de Veraguas, N. Grenada. Mr. R. W. Mitchell.

Mus. Academy Natural Sciences.

The colors of this species are quite similar to those of *Tantilla reticulata nob.* from the same locality. Its physiognomie is very unprepossessing.

SCOLECOPHIS FUMICEPS Cope.

Head not distinct from the body. Scales in fifteen rows. Frontal plates broad and short; vertical broad, presenting an obtuse angle anteriorly, an acute one posteriorly, its occipital suture longer than its superciliary. Occipitals large, as long as postfrontals and vertical together. Prenasal large; postnasal prolonged to the single preocular, excluding the loreal. Postoculars two. Superior labials seven, third and fourth entering the orbit, seventh largest. Temporals, two large and two small. Inferior labials six, fourth the largest. Breadth of anterior geniæ equal to half their length, which is greater than that of the posterior pair. Gastrosteges 132; a divided anal; urosteges 42.

Total length 5 inches; tail 1 in. 10 lin.

Coloration. Above, uniform pale brown, shading into dirty white beneath. The top of the head, including the oculars and temporals, and for four scales back of the occipitals, blackish-brown. Rostral, prefrontals and upper labials, pale brownish.

Habitat. Probably Cuba.

Mus. Comparative Zoology, Cambridge, Mass.

Fam. ADENOMIDÆ.

Opisthoglossa platydactyla without maxillary teeth, with perfectly developed ear, parotid glands, dilated apophyses of sacral vertebra, and palmate feet.

ADENOMUS Cope.

Hylæform. Head broad, short. Parotids above the shoulder, long and narrow; skin rough. Vomerine teeth none. Tongue elongate, oval, almost cylindrical anteriorly, posteriorly entire, and free for about two-fifths its length. Tympanum indistinct. Fingers very slightly webbed, the palettes of moderate size. A subgular vocal sac.

A. RADIOFLAVUS Cope.

Muzzle short, elevated; canthus rostralis concave. Nostril oval, lateral. Eyes very large, transverse diameter of the eyelids greater than that of the ossa frontalia. Tympanum inconspicuous, surmounted by small tubercles. Skin of the whole upper surface tuberculous, and especially that of the scapular protuberance, and a short lateral fold. No gular or pectoral fold; tarsus half the length of the tibia, which is but little longer than the fourth phalanx. Two tubercles on the metatarsus, one on the metacarpus. First finger half the length of the fourth.

Coloration. Above, ground color, fulvous. The sides as far as the eye, a spot above the anterior canthus of the latter, one upon each eyelid, a band beginning upon the occiput and bifurcating between the parotids, and a large chevron-shaped band upon the sacral and iliac regions, ferruginous or bay. A 1860.]

broad band of the same bordered with yellow, crosses the closed femora-tibiæ and tarsi. A similar one crosses the fore-arm. Upper lip varied with yellow; a band of the same, extending from the angle of the mouth to the shoulder. Under surface of the belly and extremities, saffron yellow, with some irregular medial spots of an orange bay color.

Length from muzzle to end of coccyx 1 inch, $2\frac{1}{2}$ lines. Femur from coccyx $6\frac{1}{2}$ lines, tibia nearly 7 lines.

Habitat. Ceylon. Mus. Acad. Nat. Sciences. From Mr. H. Cuming, in ex.

PHYLLOBATES TRUNCATUS Cope.

Skin above and below smooth, except some faint granulations upon the posterior part of the abdomen. Tongue small, linear, entire. Thumb nearly as long as the middle digit. Front and canthus rostralis convex. Muzzle concave truncate, elevated; nostrils lateral. Tympanum very near the eye, less than half its size.

Coloration. Upper and lower surfaces of head, body and extremities a dark ferruginous maroon. A pale, curved line upon each side; beneath this another one, which unites with its fellow upon the anterior part of the abdomen. From this point of junction a medial band takes its rise, and bifurcates posteriorly. A pair of parallel lines upon the throat, which unite anteriorly, following the curve of the mandible. Extremities sparsely and irregularly spotted with the same faint shade.

Habitat.? New Grenada. Mus. Academy. From the Philadelphia Museum, in exchange.

The species of this genus hitherto described, are *P. bicolor* *Bibron*, from Cuba, *P. melanorhinus* *Berthold*, from New Granada, and *P. auratus* *Girard*, from Chili.

SPELERPES BELLII Gray.

"*Oedipus platydaetylus* Tschudi." Baird, Journal Acad. Nat. Sci., Philada. 2d ser. vol. i. pp. 282-286, January, 1850. (Not of Tschudi.)

Spelerpes Bellii Gray, Catalogue Amphibia in Brit. Mus., p. 46, June, 1850.

Bolitoglossa Mexicana Duméril, (pars), Erp. Gen., vol. ix., p. 93, 1854. (Exclus. all the synonymy). Pl. 105, fig. 2.

"*Salamandra togata* Valenciennes, Mus. Paris." Duméril.

Specimens of this fine Salamander are now in possession of the Academy and of the Smithsonian Institute, which were brought from Jalapa, Mexico, by the well known collector, Sr. De Oca. Though it is a species apparently well known in European collections, considerable confusion exists with regard to the synonymy. This it is the object of the present article to set right as far as the means at the author's disposal may enable him to accomplish it.

The first published notice of this species is probably that of Professor S. F. Baird, in his valuable "Revision of the North American Tailed Batrachia," as above cited. He supposed it to be the *Oedipus platydaetylus* of Tschudi, as it appears to me incorrectly, though the meagre diagnosis of that author renders any identification sufficiently hazardous. The name at the head of this article is that of Dr. J. E. Gray, whose description in the "Catalogue of Batrachia Gradientia in the British Museum," no doubt, applies to this species. It is the first name published with an appropriate specific diagnosis, and therefore is adopted here. Dr. Gray was, however, not aware that to the present species belongs the synonymy and notice of the structure of the toes, quoted from Baird, under the genus *Oedipus* of the "Catalogue." That this is the case, I have upon the excellent authority of Prof. Baird himself, who states that the appearance of "sucker-like discs upon the extremities of the toes, similar to those of *Hyla*," resulted from the contraction of the integuments about the proximal phalanges, in an old specimen, thus giving prominence to the small tubercle upon the inferior surface of the extremity of each toe. The *Oedipus* of Gray appears to be the *Oedipus* of Tschudi, but I have seen neither specimens nor descriptions which correspond with that of his *O. variegatus*.

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The best description of the *Spelerpes Bellii* is the first part of that above cited, from the *Erpetologie Générale*, and which should be regarded as indicating the *Bolitoglossa Mexicana* of the author of that work, although the same species is figured as a variety of another, described in the text in a supplement to the description of the first. The animal described in the supplement, is there regarded, it would appear, correctly, as the *Oedipus platydactylus* of Tschudi, and is not only specifically, but probably generically distinct from *Spelerpes Bellii*.

In size this species is only exceeded by some of the *Amblystomata* of the Mississippi Valley: one of our specimens is at least eight inches long. The tail, whose length is about equal to that of the head and body, is compressed toward the tip, but cylindrical and greatly swollen at the base, as in *Hemidactylum scutatum*, though in a greater degree. It is encircled by grooves similar to those of the flanks. The toes are short, broad, depressed, very distinct, and with scarcely a trace of connecting membrane at the base, certainly much less in our specimens than is represented in the fig. in *Erp. Générale*. The extremity of each is provided beneath with a knob or callosity. The palatine teeth extend from the very exterior point of the posterior border of the palatine bones, and from two nearly transverse arched series, which meet near the centre of the suture with the sphenoid bone. This resembles the arrangement in the *Geotriton fuscus* and the *Heredia* of Girard, rather than the ordinary *Spelerpes*, where the series are shorter, more oblique, and not in contact. The patches of sphenoid teeth are more distinct and elongated than in the species of *Plethodon*, but less so than in *Pseudotriton ruber*. A considerable space separates these from the posterior angle of the palatine series.

The fresh specimens of this species that I have seen are of a lead color, other specimens are much darker, but whether this is a result of long preservation in spirits I am not able to state. Upon the back is a double row of obliquely pyriform spots of an orange red in life, but which became yellowish white in spirits. These become confluent upon the neck, and, according to authors, are sometimes preceded by a pair of large spots of the same color upon the occiput. Belly immaculate.

GEOTRITON CARBONARIUS Cope.

? "*Salamandra platydactyla* Cuvier, Mus. Paris."

? *Oedipus platydactylus* Tschudi, Classif. der Batrachier, p. 93, 1838.

Bolitoglossa Mexicana Dumeril, *Erp. Gén.*, vol ix. p. 93, 1854. (Specimens from Vera Paz.) Pl. 105, fig. 1.

There can be little doubt that a salamander exhibiting a structure of the feet similar to that of the present species, furnished the characters of Tschudi's genus *Oedipus*, and also that of Dr. Gray. What *species* this reptile pertained to, cannot readily be ascertained, as no description of it appears to have been published, unless it be identical with the *O. variegatus* of the latter author. In this case it is not probably the same as that figured in the *Erpetologie Générale*, and of which two specimens are before me.

It is evident that the *Oedipus* of Tschudi cannot be retained, as founded upon an undescribed species,—even were it sufficiently distinct. That it is not distinct from the *Geotriton* of Bonaparte, is very probable, although it is contrary to analogy to find a genus of reptiles in so southern a latitude as that of Jalapa identical upon another hemisphere. With the *Geotriton fuscus* *Bp.* before me, I find the following characters common to it and the species which is the subject of this article. Supra and postorbital bony arches absent. Palatine teeth in two transverse regularly arched series almost in contact medially. Sphenoid teeth numerous, in two oval patches upon the sphenoid bone, separated by an interval from the palatines. Tongue boletoid. Parotids none. Tail cylindrical. Digits 4—5, slender, united by a broad membrane.

The broad palmation of the fingers and toes distinguishes the genus from 1860.]

Spelerpes. In the latter genus and its allies, the toes are distinct at all seasons of the year, differing in this respect from the Tritons.

Upon comparing the dorsal vertebræ of the *Geotriton fuscus* and *carbonarius*, little material difference is apparent. Those of the former are not so stout, and have the external ridge of the anterior zygapophysis more compressed and elevated. In both, there is a single longitudinal spinous process, but little elevated, obsolete upon the posterior part of the vertebra.

The largest specimen of *Geotriton carbonarius* measured three inches from the end of the muzzle to the vent: from the latter point to the end of the tail is three in. three lines. The ground color above and below is black: the back is marked with a broad, irregularly defined brownish yellow band, which extends upon the base of the tail, and bifurcates upon the neck and occiput, leaving a deltoid space of the ground color. This dorsal band is more uniform in a younger specimen. The soles of the feet are pale. There are ten teeth in each of the palatine series, and about three hundred and thirty in the confluent sphenoidal patches. These patches are distinct anteriorly and posteriorly. In *Spelerpes Bellii*, they are entirely distinct, and more clavate in outline.

Catalogue of Birds from the Island of St. Thomas, West Indies, collected and presented to the Academy of Natural Sciences by Mr. Robert Swift. With Notes,

BY JOHN CASSIN.

1. *TINNUNCULUS SPARVERIUS*, (Linnæus).

Falco sparverius, Linn. Syst. Nat. i. p. 123, (1766).

Falco dominicensis, Gm. Syst. Nat. i. p. 285, (1788).

Wilson's Am. Orn. ii. pl. 16, iv. pl. 32. Aud. B. of Am. pl. 42, oct. ed. i. pl. 22.

In a very fine series of specimens in Mr. Swift's collection, I find some characters which are slight, but may be constant, and possibly indicate specific distinctness from the common bird of the United States. The wing coverts have much more numerous spots of black, and the outer tail feather has its inner web always partly, and frequently entirely rufous, the same color as the other tail feathers, and its outer web white, with segments or semi-circular spots of black, having for their bases the shaft of the feather, and all the feathers of the tail are more or less edged and banded with black on their upper surface. These characters are not usually seen in *F. sparverius* of the United States, but are present in every specimen in the present series, and seem especially to characterize the adult plumage. The colors also are rather brighter than in our northern species.

Seven specimens are in this collection, of which four are in adult plumage. In all of them, of whatever age, there is a large rufous space on the crown, and the size is very nearly the same as that of specimens from Pennsylvania, or perhaps slightly smaller. The plumage of the present specimens does not correspond with that of either of the proposed distinct species of authors.

2. *GYMNOGLAUX NUDIPES*, (Daudin).

Strix nudipes, Daud. Traite d'Orn. ii. p. 199, (1800).

Scalater's Ibis, 1859, pl. 1. Vieill. Ois. Am. Sept. pl. 16.

Two specimens in Mr. Swift's collection are much as represented in Mr. Newton's excellent plate, and as described in his very valuable paper on the Birds of St. Croix, in Scalater's Ibis, as cited above. A wide superciliary band of white is, however, more conspicuous in both of the present specimens, than as represented in the plate, and there are a few other not important differences. The *tarsus* is bare for about its lower two-thirds, in this singular species, and covered with very small circular or hexagonal scales. Bill and claws light greenish-yellow, which is probably also the color of the feet in the adult bird.

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This curious and little known owl, is an exceedingly interesting contribution by Mr. Swift to the collection of this Academy, to which specimens from him were for the first time presented some years since. Previously, it was unknown to the naturalists of this country, though they were constantly reminded of it by Vieillot's plate in Ois. d'Am. Sept., cited above. The specimens described originally by Daudin, were from the Island of Porto Rico.

3. *TYRANNUS DOMINICENSIS*, Brisson.

Tyrannus dominicensis, Briss. Orn. ii. p. 394, (1760).

Tyrannus griseus, Vieill. Ois. d'Am. Sept. i. p. 76, (1807).

Vieill. Ois. d'Am. Sept. pl. 46. Aud. B. of Am. pl. 170, oct. ed. i. pl. 55.

Numerous specimens very similar to specimens from Florida, but rather lighter colored. I am not sufficiently acquainted with the difficult group of American flycatchers to have entire confidence in my provisional conclusions, but, at present, I am inclined to think the bird now before me, in Mr Swift's collection, is probably entitled to be regarded as distinct, specifically, from the bird of the Southern United States usually bearing the same name.

4. *TYRANNULA MARTINICA*, (Linnæus).

Muscicapa martinica, Linn. Syst. Nat. i. p. 325, (1766).

Muscicapa albicapilla, Vieill. Ois. d'Am. Sept. p. 66, (1807).

Muscicapa martinicana cristata, Briss. Orn. ii. p. 362.

Vieill. Ois. d'Am. Sept. pl. 37. Brisson Orn. ii. pl. xxxvi. fig. 2.

This species scarcely appears to have been identified by late naturalists, but like many others founded on Brisson's descriptions and figures, it is undoubtedly an absolute and veritable existence. That great ornithologist and most excellent describer, mainly, and in fact almost entirely, relies on specimens actually before him, for descriptions, and is exceedingly careful to refer to the collections in which they are to be found. His figures frequently are not recognizable, but no descriptions extant are more complete and satisfactory.

One specimen only, in Mr. Swift's collection, is not in fully mature plumage, but appears to be the bird described by Brisson, as above, to which Linnæus gave a name, and an abstract of Brisson's description. It more nearly corresponds with Vieillot's description than with his figure above cited, but appears to be the species of that author. It is a white-crested species, strictly of the same group, and much resembling *Tyrannula albiceps*, (D'Orbigny et Lafresnaye), and about the same size.

This is one of the most interesting birds in Mr. Swift's collection, and we hope to receive other specimens, which he has kindly promised to endeavor to procure. Like all birds in the present collection, it was obtained by Mr. Swift, in the Island of St. Thomas. Brisson's specimens were from the Island of Martinique.

5. *VIREOSYLVA ALTILOQUA*, (Vieillot).

Muscicapa altiloqua, Vieill. Ois. d'Am. Sept. i. p. 67, (1807).

Vireo longirostris, Swains. Faun. Bor. Am. ii. p. 237, (1831).

Phyllomanes mysticalis, Cabanis ?

Turdus hispaniolensis, Gmelin ?

Cassin, B. of Cal. and Texas, pl. 37. Vieill. Ois. d'Am. Sept. pl. 38. Edwards' Birds, v. pl. 253.

Mr. Swift's specimens appear to be rather large, but they are apparently identical with the bird of Jamaica and Cuba, and a visitor to Florida. It is easily recognized and distinguished from all other species by the narrow line of black running downward, on each side of the neck, from the base of the lower mandible. I much regret that there is not at present in the Acad. Mus. a series of specimens of this species, sufficient for comparison with those in the present collection, which, according to my recollection, are larger than usual, 1860.]

and especially stronger in the bill. All the specimens of this species, except one, and specimens of various other species of this group, were stolen by a visitor to the Acad. Mus. some years since, and never recovered.

Several specimens, in excellent plumage and condition, are in Mr. Swift's collection.

6. *DENDROICA PETECHIA*, (Linnæus).

Motacilla petechia, Linn. Syst. Nat. i. p. 334, (1766).

Motacilla ruficapilla, Gm. Syst. Nat. ii. p. 971, (1788).

Chloris eritachoides, Feuille, Jour. Obs. Phys. iii. p. 413, (1725).

Ficedula pensylvanica erythrocephalos, Briss. Orn. iii. p. 488.

Ficedula martinicana, Briss. Orn. iii. p. 490, (1760).

Edwards' Birds, v. pl. 256, fig. 2. Vieill. Ois. d'Am. Sept. ii, pl. 91.

Bris. Orn. iii. pl. xxii. fig. 4.

This is undoubtedly the true *Motacilla petechia*, Linnæus, founded on the description of *Ficedula martinicana*, by Brisson, as above cited. Though we have frequently seen this species in collections, Mr. Swift's specimens are the first that have come under our notice, the locality of which is authentic.

Numerous specimens in Mr. Swift's collection are in various plumages, though the greater number are nearly or quite mature, and show the reddish chesnut-colored crown quite well defined and conspicuous. This bird is larger than *D. castiva* of the United States, with which it has sometimes been confounded, and is not difficult to recognize from Brisson's excellent description above cited. It is the same bird also as Brisson's *Ficedula pensylvanica erythrocephalos*, founded on Edwards' figure, above referred to, who (Edwards) expressly states that he did not know the locality of the specimen figured, but guessed, wrongly, that another, received from Pennsylvania, was the female of the same species. Hence concluding erroneously that his bird was a North American species. This erroneous guess and conjectural conclusion misled Brisson, Buffon, and a host of other authors, to the present era, but is easily detected by referring to the text of Edwards, vol. v. p. 99.

7. *PARULA AMERICANA*, (Linnæus).

Parus americanus, Linn. Syst. Nat. i. p. 341, (1766).

Motacilla eques, Bod. Tab. Pl. Enl. p. 46, (1783).

Motacilla americana et ludoviciana, Gm. Syst. Nat. i. p. 960, 983, (1788).

Sylvia torquata, Vieill. Ois. d'Am. Sept. ii. p. 38, (1808).

Sylvia pusilla, Wilson, Am. Orn. iv. p. 17, (1811).

Buff. Pl. Enl. 731, fig. 1. Vieill. Ois. d'Am. Sept. ii. pl. 99. Wilson,

Am. Orn. iv. pl. 28. Aud. B. of Am. i. pl. 15 oct. ed. ii. pl. 91.

One specimen only, in Mr. Swift's collection, is specifically identical with numerous others now before me, from the neighborhood of Philadelphia. In nearly mature plumage and excellent preservation, and probably a winter traveller from its place of nativity in the North.

8. *MERULA FUSCATA*, (Vieillot).

Turdus fuscatus, Vieill. Ois. d'Am. Sept. ii. p. 2, (1807).

Vieill. Ois. d'Am. Sept. ii. pl. 57, bis.

Numerous specimens, and apparently a common species in several of the islands of the West Indies.

9. *PHONIPARA BICOLOR*, (Linnæus).

Fringilla bicolor, Linn. Syst. Nat. i. p. 324, (1766).

Tiaris omissa, Jardine, Ann. and Mag. Nat. Hist. xx. p. 332, (1847)?

Catesby's Carolina, i. pl. 37. Gosse, B. of Jamaica, pl. 64.

Two specimens only, in Mr. Swift's collection, are not in fully mature plumage, and we look for others from him with interest. They do not correspond in all respects with specimens in the Acad. Mus., which we have hitherto regarded as certainly the species to which this name is applicable, but we cannot, at present, venture to indicate a different species. It is possible that these

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specimens are Jardine's *Tiaris omissa* described as above cited, from the Island of Tobago.

10. *CERTHIOLA FLAVEOLA*, (Linnæus).

Certhia flaveola, Linn. Syst. Nat. i. p. 187, (1766).

Nectarinia antillensis, Lesson, Traite d'Orn. i. p. 304, (1831).

Certhia bartholemica, Sparrm. Mus. Carls. No. 57, (1788)?

Catesby, Carolina, pl. 59. Swains. Zool. Ill. pl. 52. Gosse, B. of Jam. pl. 16.

Numerous specimens, in good plumage and excellent condition. They appear to be the same as described and figured by Mr. Gosse, as above, from the Island of Jamaica, and are probably of the species best entitled to the name given by Linnæus.

11. *LAMPORNIS AURULENTUS*, (Aud. et Vieillot).

Trochilus aurulentus, Aud. et Vieill. Ois. Dor. i. p. 29, (1802).

Trochilus dominicus, Linnæus?

Trochilus margaritaceus, Gmelin?

Gould, Monog. Troch. pt. xv. pl. Aud. et Vieill. Ois. Dor. pl. 12, 13.

Numerous specimens of both sexes, and in mature plumage.

12. *EULAMPIS HOLOSERICEUS*, (Linnæus).

Trochilus holosericeus, Linn. Syst. Nat. i. p. 191, (1766).

Gould, Monog. Troch. pt. xiv. Aud. et Vieill. Ois. Dor. pl. 6, 65.

Appears to be this species, and evidently abundant in the Island of St. Thomas. The numerous specimens in Mr. Swift's collection are in very fine plumage.

13. *CONURUS XANTHOLÆMUS*, Selater.

Conurus xantholemus, Selat. Ann. and Mag. Nat. Hist. 1859, p. 225.

Conurus chrysogenys, Massena et Souance, Rev. et. Mag. Zool. 1854, p. 72?

Numerous specimens of both sexes, in mature plumage, and others, which are young birds. This appears to be the bird described by Mr. Selater, and we much suspect is also the bird described by Messrs. Massena and Souance, as above cited, its affinities being, perhaps, more accurately stated by the latter authors.

14. *MELANERPES PORTORICENSIS*, (Daudin).

Picus portoricensis, Daud. Am. du Mus. Paris, ii. p. 285, (1803).

Picus rubidicollis, Vieill. Ois. d'Am. Sept. ii. p. 63, (1807).

Vieill. Ois. d'Am. Sept. ii. pl. 117. Shaw, Nat. Misc. xxii. pl. 953.

Several specimens in excellent plumage and preservation.

15. *COCCYZUS SENICULUS*, (Latham).

Cuculus seniculus, Lath. Ind. Orn. i. p. 219, (1790).

Aud. B. of Am. pl. 169, oct. ed. iv. pl. 277?

Several specimens in Mr. Swift's collection, quite identical with others before us, in Acad. Mus., labelled as from various localities in the West Indies, and Northern South America; but I think, scarcely, the bird figured by Audubon.

16. *CROTOPHAGA ANI*, Linnæus.

Crotophaga ani, Linn. Syst. Nat. i. p. 154, (1766).

Buff. Pl. Enl. 102.

Numerous specimens.

17. *COLUMBA CORENSIS*, Jacquin.

Columba corensis, Jacq. Beytr. Gesch. Vog. p. 31, (1784).

Columba monticola, Vieill.

Columba portoricensis, Temm.

Columba imbricata, Wagler.

Knip, Pigeons, i. pl. 15. De Sagra's Cuba, Aves, pl. 27.

Numerous specimens in mature plumage. Apparently precisely the same as the bird of Cuba, and other islands of the West Indies.

18. *ZENAIIDA AMABILIS*, Bonaparte.

Zenaida amabilis, Bonap. Comp. List.

Bonap. Am. Orn. iii. pl. 17, fig. 2. Aud. B. of Am. pl. 162, oct. ed. v. pl. 281.

Several specimens in very fine plumage and excellent preservation.

19. *CHAMÆPELIA TROCHILA*, Bonaparte.

Chamæpelia trochila, Bonap. Consp. Av. ii. p. 77, (1857).

Various specimens in Mr. Swift's collection appear to be this species. They are not, however, in mature plumage.

20. *EUPSYCHORTYX SONNINI*, (Temminck).

Perdix Sonnini, Temm. Fig. et. Gall. iii. p. 451, (1815).

Temm. pl. col. 75. Gould, Monog. Odont. pl. 11.

Very fine and mature specimens of both sexes.

Mr. Swift has had the kindness to inform me that this species was introduced into the Island of St. Thomas some years since, from Venezuela, and that it has now become of frequent occurrence, quite naturalized, and rearing young freely throughout the island. The present specimens are exactly the species figured by Mr. Gould under this name, and identical with specimens in Acad. Mus., labelled "Venezuela" and "Cumana."

21. *AEGIALITIS WILSONIUS*, (Ord.)

Charadrius Wilsonius, Ord. Wilson's Am. Orn. ix. p. 77, (2d ed. 1825).

Charadrius crassirostris, Spix, Av. Bras. ii. p. 77, (1825).

Wilson, Am. Orn. ix. pl. 73. Aud. B. of Am. pl. 219, oct. ed. v. pl. 319.

Several specimens quite identical with the bird of the eastern and southern coasts of the United States. This species evidently has an extended range of southern migration during the winter season, though the present locality is the most southern that we have yet seen from the West Indies. Its range on the coast of the Continent is more southern, and certainly extends to the coast of Brazil.

22. *GALLINULA GALEATA*, (Lichtenstein).

Crex galeata, Licht. Verz. p. 80, (1823).

"*Gallinula chloropus*," Auct.

Bonap. Am. Orn. iv. pl. 27. Aud. B. of Am. pl. 244, oct. ed. v. pl. 304.

A single specimen, in very fine plumage.

23. *RALLUS LONGIROSTRIS*, Boddaert.

Rallus longirostris, Bodd. Tab. Pl. Enl. p. 52, (1783).

Rallus crepitans, Gm. Syst. Nat. i. p. 713, (1788).

Aud. B. of Am. pl. 204, oct. ed. v. pl. 310. Buff. Pl. Enl. 849.

Like many other of the shore birds common in the summer, on the coast of the United States, this species performs a very extensive migration, extending, probably, to almost the entire eastern coast of South America, and all the islands of the West Indies. The present specimens are identical with the bird which is abundant on the coast of New Jersey, and in much the same plumage seen in September, or later in the autumn.

The proper name for this species, I have no doubt, is that here given. The figure in Buffon, as cited, probably represents an autumnal or winter plumage.

24. *BUTORIDES VIRESCENS*, (Linnæus).

Ardea virescens, Linn. Syst. Nat. i. p. 238, (1766).

Wilson, Am. Orn. vii. pl. 61. Aud. B. of Am. pl. 333, oct. ed. vi. pl. 367.

A single specimen, not in mature plumage, is this, or a nearly allied species. Probably a winter sojourner from the North.

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25. *NYCTHERODIUS VIOLACEUS*, (Linnæus).

Ardea violacea, Linn. Syst. Nat. i. p. 238, (1766).

Ardea jamaicensis et cayanensis, Gm. Syst. Nat. i. p. 625, 626, (1788).

Wilson, Am. Orn. viii. pl. 65. Aud. B. of Am. pl. 336, oct. ed. vi. pl. 364.

Another wanderer, possibly from the Southern States of North America, though understood to be resident in some of the West Indies. One specimen only, in Mr. Swift's collection, is in quite mature plumage, and is identical with specimens from the State of Georgia, in the Academy's Museum.

26. *ONYCHOPRION FULIGINOSUS*, (Gmelin).

Sterna fuliginosa, Gm. Syst. Nat. i. p. 605, (1788).

Wilson, Am. Orn. viii. pl. 72. Aud. B. of Am. pl. 235, oct. ed. vii. pl. 432.

A single specimen in mature plumage, is the same species figured by Wilson and Audubon. As a bird of North America, it is only known as inhabiting the extreme southern coast of the United States, but is abundant in the whole southern hemisphere.

27. *THALASSEUS*.

A specimen of a young bird of a large, thick-billed species, which I fail to recognize. It may, however, be a common species.

With this species we close this collection, which, though few in number of species, is a highly interesting and valuable contribution to the Museum of our Academy.

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Descriptions of new species of Crinoidea and Echinoidea from the Carboniferous rocks of Illinois, and other Western States.

BY F. B. MEEK AND A. H. WORTHEN,

Of the Illinois State Geological Survey.

Although we have not yet had time to write out full remarks upon the relations of the species described in this paper, we would state that we have compared them carefully, not merely with figures and descriptions, but with authentic specimens of a large majority of the known American Carboniferous species. In comparing them with the forms figured and described in the Iowa Report, as well as with a large number of other Western Carboniferous forms named and described, though not yet published, by Prof. Hall, we have possessed the advantage of having at hand, in almost every instance, the original types of those species which belong to, and are now in the possession of one of the authors.*

Full illustrations of all the species, together with remarks, comparisons and extended descriptions will appear in the forthcoming report of the Geological Survey of Illinois.

Genus *PLATYCRINUS*, Miller.

PLATYCRINUS PRATTENANUS.—Calyx small, wider than high, distinctly truncated below and widening gradually upwards, composed of thick, smooth, slightly convex plates, which are united, (excepting the basal series) by grooved sutures. Base comparatively large, more than one-third as high, as wide, and provided with a small rim around the margin of the broad truncated under side; consisting of one pentagonal, and two hexagonal plates, the upper side of the latter being concave in the middle, and about twice as long as the superior lateral slopes; sutures carinated, the carinæ passing down over the marginal rim of the under side. Columnar facet large, or more than half as wide as the base, and slightly concave. First radial plates a little wider than high, quadrangular, nearly as wide at the base as above, somewhat convex on the

* Since this was in type we have received a copy of Prof. Hall's supplement to the Iowa Report, in which we see he describes other species not contained in the collections alluded to above. We have carefully compared his descriptions of these additional species with ours, described in this paper, and believe them to be all distinct, unless our *Dichoerinus conus* may be identical with his *D. leviss*.

under side, and provided with a rather broad rounded sinus above for the reception of the second radials, the lower margin of the excavation being but very slightly projecting. Second radial pieces small, much wider than long, triangular, and about filling the sinus in the upper side of each first radial; concave on their upper sloping sides, which support the primary divisions of the arms. (Anal and interradial pieces unknown.)

The arms, after the first division on the second radial plate, bifurcate again on the second piece, and at least two of the inner of these subdivisions, divide once more on the second piece, (in two of the arms examined). Above these last divisions each arm is slender, nearly cylindrical, and consists of a single series of plates for a short distance, then gradually passes into a double alternating series. The tentacles are closely arranged, and rather thick, where they connect with the arm pieces, but soon taper, and appear to be all made up of long slender joints.

Height from the base to the summit of the first radials, 0.35 in; breadth at the top of first radials, 0.45 inch; breadth of base, 0.37 inch; height of do., 0.13 inch; height of first radials, 0.24 inch.

Named in honor of Mr. Henry Pratten, deceased, formerly of the Geological Survey of Illinois.

Locality and position. Randolph County, Illinois. St. Louis, Limestone of the Subcarboniferous series.

PLATYCRINUS PENICILLUS.—Body small, subglobose, a little wider than long, composed of thin plates, connected by moderately distinct sutures, and ornamented by small tubercles or coarse granules, which, on the first radial plates, show a tendency to range themselves in a few radiating rows from the middle of the upper side. Base comparatively large, much depressed, considerably wider than high, and broadly truncate, with a marginal rim below. First radial pieces large, nearly flat, and a little higher than wide; widening somewhat from the base, subquadrangular, the upper angles being slightly truncate by the interradial and anal pieces; sinus in the upper side for the reception of the second radial pieces shallow, and apparently about half as wide as the superior edge. Second radials small, triangular, wider than long, and supporting on their upper sloping edges the first divisions of the arms. (Anal and interradial pieces unknown.)

Above the first bifurcation on the second radial pieces, the two divisions of the arms subdivide on the second piece, and the two middle subdivisions each bifurcate again on the second piece, beyond which they are all simple. Immediately above the last bifurcations, the arms consist of a single series of pieces, which are somewhat wedge-shaped, or alternately longer and shorter on opposite sides; then gradually pass into a double series of alternating joints above. The larger single arm pieces, below the bifurcations, and for a short distance above, are generally longer than wide, narrow around the middle, and broader at each extremity, the superior lateral angles projecting for the reception of tentacles. All the larger arm pieces are connected by peculiar undulating sutures.

The column is comparatively large, and seems to have been very flexible. Near the body it is rounded and composed of thin alternately larger and smaller segments, with sharp edges, which are often crenulated. Farther down it becomes alternately compressed in opposite directions, at intervals of about every five joints; while all the joints increase somewhat in thickness, and are ornamented with distinct spine-like projecting points or crenulations. About every fifth segment is more prominent on its edges than the others.

Length of body from base to the summit of the first radials, 0.21 inch; breadth, about 0.26 inch; length of arms, near 0.89 inch

Locality and position. Hardin County, Illinois. St. Louis Limestone, of the subcarboniferous series.

PLATYCRINUS PLENUS.—Calyx subglobose, wider than high, composed of thin,

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slightly granulose plates. Base basin-shaped, expanding rapidly from its small truncated columnar facet, considerably wider than high, and provided with carinated sutures. First radial plates large, about as high as wide, subquadrangular in outline, the two superior angles being rather distinctly truncated for the reception of the interradial pieces; all nearly, or quite as wide below as above, and provided with a rounded sinus in the upper edge equal to about half their own breadth, for the reception of the second radial pieces. Second radials very small, triangular, about half as long as wide, and supporting on their superior sloping sides, which are distinctly concave, the first divisions of the arms. (Anal plates unknown). Interradial pieces comparatively large, and each provided with a rather distinct central spine or tubercle.

The arms are rather small, and above the first division on the second radial piece, bifurcate again on the second piece, beyond which they appear to be simple in most cases, though some of them present the appearance of subdividing again on the second piece. Above the last bifurcation, they are at first composed of a single series of joints, but gradually pass into a double alternating series. All the joints below the bifurcations, and some of the larger single ones above, are rather long, constricted around the middle, and provided with a prominent projection on each side above.

The column is compressed, twisted, and composed of nearly equal, rather short segments, which are occasionally armed with short conical nodes or spines.

Height from the base to the summit of the first radials, 0.43 inch; breadth, 0.58 inch; breadth of base, 0.45 inch; height of do., 0.15 inch.

Locality and position, same as last.

Genus DICHOCRINUS, Munster.

DICHOCHRINUS CONSTRICTUS.—Body small, oval subglobose, widest above, constricted a little below the middle, and rounded or slightly truncate beneath; composed of thick plates, which appear to have been smooth, and are joined by linear sutures. Base comparatively large, or forming about one-third the entire length of the body, twice as wide as high, and more or less concave in the middle below; each of its pieces having five obscure angles above, with slight concavities between for the reception of the succeeding range of plates; columnar facet very small and round. First radial plates higher than wide, a little unequal, having an oblong subquadrangular outline, the two upper angles of each being slightly truncated, apparently for the reception of very small interradial pieces; one of them having a fifth obscure angle in the middle of the under side. Sinus in the upper side of each first radial for the reception of the second radials, rounded, and from one-third to one-half the breadth of these plates. Anal piece slightly larger than the first radials, and having a subpentagonal outline, narrowing upwards a little, and like the first radials, curving inward above. (Other parts unknown.)

Length, 0.39 inch; breadth above the middle, 0.38 inch; do. at the constriction below the middle, 0.32 inch; breadth of base, 0.33 inch; height of do., 0.14 inch.

Locality and position. Bloomington, Indiana; in beds probably equivalent to the Warsaw Limestone, of the subcarboniferous series.

DICHOCHRINUS CONUS.—Body large, obconical, longer than wide, composed of thin, smooth plates, which are united by close fitting, linear sutures. Base comparatively large, a little longer than wide, tapering regularly to the small inferior extremity, which is slightly truncate; both pieces subtrigonal in outline, though really hexagonal, if we count the slightly salient angles between the shallow sinuosities in the upper margins; columnar facet small, round? and provided with a small rim. Radial pieces large, longer than wide, presenting an oblong outline, slightly wider above than at the base; all more or less convex on the inferior margins, which in the anterior one, is provided with an obtuse central angle; sinus in the upper margin of each, about one-third as wide 1860.]

as the superior edge, and excavated down nearly one-fifth the length of the plate, its lower edge projecting distinctly outward. Anal plate hexagonal, as long as the radials, but a little narrower, about twice as high as wide.

Each radial plate, as well as the anal piece, has an obscure rounded ridge extending down the middle to its base, so as to give the body a slightly sub-hexagonal outline when viewed from below. These prominences are also continued on down upon the basal pieces, gradually becoming obsolete as they converge toward the narrow lower extremity.

Length of the body to the summit of the first radials, 1.31 inches; breadth about 1.16 inches; height of base 0.58 inch; breadth of do. above, 0.76 in.

Locality and position. Cedar Creek, Warren County, Illinois. Burlington, Limestone of subcarboniferous series.

DICHOCRINUS (PTEROTOCRINUS) CRASSUS.*—Body below the arms of medium size basin-shaped, or more than twice as wide as high, widening rapidly upwards from the base, and composed of thick, apparently, smooth plates, which are very slightly convex, and connected by linear sutures. Base comparatively large, about four times as wide as high, distinctly concave below, and widening upwards from its rounded lower margin; subcircular in outline, being scarcely impressed at the sutures; columnar facet round, concave, and about one-fourth as wide as the base. First radial plates broader than long, widening regularly upwards from the base, and all concave on the upper side, which is longer than either of the others; four of them quadrangular, and one on the anterior side probably subpentagonal, from the presence of a fifth obscure angle at the middle of the under side. Second radial pieces very small, about twice as wide as long, subtrigonal in outline, and supporting on their superior sloping sides, (which are a little concave,) the two middle arms, while the two lateral arms rest partly upon their wedge-shaped lateral extremities, and in part directly upon the first radials. The anal piece is rather more than half as large as the first radial plates, a little longer than wide, (the lateral margins being nearly parallel or slightly convex in outline,) and presenting a subquadrangular form, with a fifth obscure angle at the middle of the base.

*This and the first of the following species, evidently belong to the same group as the species upon which Mr. Lyon proposed, in the third volume of the Geological Survey of Kentucky, to found a new genus under the name of *Asterocrinus* (*Pterotocrinus*, Lyon & Casseday). The species of which it is composed present marked differences from what are regarded as typical species of *Dichocrinus* in the old world, and we have little doubt in regard to the propriety of separating them from that genus. As there are, however, some differences of opinion, amongst paleontologists, in relation to the limits of the genus *Dichocrinus*, we have concluded to place our species in the group *Pterotocrinus*, using the name provisionally, however, for the present, in a subgeneric sense.

Judging from the few species of this group we have yet seen, we are led to think the formula given by Messrs. Lyon and Casseday, in their paper published in the American Journal of Science, (January, 1859,) should be modified somewhat. In one of our species there is a minute triangular piece resting upon the middle of each first radial, and partly supporting on its superior sloping sides the two pieces regarded in Messrs. Lyon and Casseday's formula as the second radial. In another of our species this minute piece is represented by a larger one of the same form, which undoubtedly bears the relations to the other parts, of a dwarfed, but true second radial; while those resting upon, and partly upon it, assume the character of secondary radials and free arm pieces. Hence we think this minute piece (which is sometimes wanting), however small it may be, should always be regarded as a rudimentary second radial piece. If we are correct in these views, the formula of this group should be stated as follows:—

Basal pieces, 2.

Radials 1 or 2×5 , the second being very small, minute, or sometimes obsolete.

Secondary radials. 1×10 , or wanting; the first free arm pieces sometimes resting partly on the second and partly on the first radials; and where the small second radial and the secondary radials are wanting, all resting directly upon the first.

Arms, 20.

Interradials unknown.

Interbrachial appendages 5, large, and more or less expanded.

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The first arm pieces are much larger than the others, and consist of a single series; but above these the arms soon pass into a double series of small alternating pieces, which are considerably wider than long, and support on the inner side a double series of closely arranged tentacles. The arms, of which there are four to each ray, or twenty in the entire series, are rounded on the outside, and deeply grooved within, slightly tapering, apparently rather long, and entirely simple. The interbrachial appendage, rising from the middle of each group of arms, is thin or knife-like, and seems to have been nearly as long as the arms.

Locality and position. Hardin County, Illinois. Chester Limestone, of sub-carboniferous series.

DICHOCCRINUS (PTEROCRINUS) CHESTERENSIS.—Body below the arms rather small, basin-shaped, or more than twice as wide as high, widening rapidly upwards from the base, the sides being slightly concave in outline; composed of moderately thick, apparently smooth plates, which are connected by linear sutures. Base more than one-third as broad as the body, about three times as wide as high, truncate and concave below, the concavity being margined by an angular rim; columnar facet small, or less than one-third as broad as the truncated under side of the base. First radial plates about the size of the basal pieces, though proportionally higher, twice as wide as long, and widening rather rapidly from below; four of them quadrangular, and one on the anterior side, pentagonal; all distinctly concave on the upper side, (which is longer than either of the others) and having their salient lateral angles above slightly truncated, apparently for the reception of small interrarial pieces. Second radial pieces minute, or merely rudimentary, triangular, and each partly supporting on its sloping upper edges two larger secondary radial pieces, which also rest with one side on the primary radials, and bear upon their superior sloping sides the first brachial pieces, the outer of which, likewise have one edge reposing upon the lateral superior edge of the first radial plates. Anal piece about one-third as large as the primary radials, ovate in form, the upper extremity being very narrow, and the long lateral margin convex, while its base has an obtuse angle on each side, and one in the middle.

The arms, of which there are four to each ray, or twenty in the entire range, are simple from their origin, rounded on the outside, deeply grooved within, and commence as a single series of larger pieces, but soon pass into a double alternating series of small pieces, which support on their inner sides two ranges of tentacles. The interbrachial appendages, if there are any in this species, are unknown.

Height from base to summit of first radial pieces, 0.16 inch; breadth at the top of first radials, 0.40 inch; breadth of base, 0.24 inch; height of do., 0.16 inch; length of anal piece, 0.15 inch; breadth of do., 0.09 inch.

Locality and position. Chester, Illinois. Chester Limestone of the sub-carboniferous series.

Genus TREMATOCRINUS, Hall, 1860.

TREMATOCRINUS FISCELLUS.*—Body short, subcylindrical, slightly longer than wide, truncated and concave at the base, and nearly flat above; sides rising

* In first sending on the description of this species to the Academy, we had proposed to found upon it a subgenus, which we placed provisionally under *Acanthocrinus*, stating, at the same time, that it presented differences from the type of that genus, that might be of full generic value. As this paper is going through the press, we have received a copy of Prof. Hall's Supplement to the Iowa Report (just published), in which we see he has described four species of this type under the name of *Trematocrinus*. We therefore cancel, in the proof of our paper, the description of the group, and refer our species, which is clearly distinct, specifically, from the forms described by Prof. Hall, to his genus *Trematocrinus*.

In our remarks (now cancelled) on this group, we had pointed out its relations not only to *Acanthocrinus*, but also to *Rhodocrinus*, Müller, and to *Goniasteroidocrinus* of Lyon and Casseday. Its analogy to the latter is so striking, that we strongly suspect the same 1860.]

almost vertically to near the arms, where they curve a little outwards. Plates nearly smooth or subgranulose, and all convex, those of the subovate inter-radial spaces less prominent than the rays, and showing a very slight tendency to develop obscure ridges, one of which passes to each side; sutures moderately distinct. Base small, entirely within the concavity of the under side, concave, and obscurely pentagonal; columnar facet large, or occupying nearly the whole area of the base, obscurely marked by radiating striae, and provided with a small pentagonal star-shaped central opening. Subradial pieces as wide as long, truncated, and narrower above than below, subquadrangular in outline, but provided with a fifth very obtuse angle in the middle below, and having each inferior lateral angle slightly truncated. First radial pieces larger than the subradials, and wedged so far in between them as to come nearly in contact with the base, about as wide as long, heptagonal, the sides connecting with subradials being longer than the others. Second radials hexagonal, as long as wide. Third radials heptagonal, and supporting on their superior sloping sides the first secondary radials, each of which is succeeded by two others, the last of which supports the first true brachial piece.

The first interrarial pieces rest upon the superior truncated side of the subradials, which are about equal in size; they are all hexagonal, the inferior lateral edges being very short, and the under side longer than either of the others. Above these there are in the second range three, in the third three or four, and in the fourth three pieces, the latter being surmounted by three or four others; all the series diminish gradually from below to the summit. (Anal plates unknown.)

The interbrachial pieces are all very small, two of them being wedged down in the narrow space between the first and second secondary radial pieces, while the others are arranged so as to form the upper and inner side of the two small ambulacral apertures—the outer and lower sides of which are formed partly by a sinus in the edge of the second secondary radial pieces, and partly by one side of the third.

The secondary radials diverge so that those belonging to different rays meet, over the centre of each interrarial space, where the arms—of which there appear to be ten, arise. The first brachial pieces are not quite free, being flanked on either side by the interbrachial pieces, forming the summit of the apertures. They are all pierced directly through the middle by the arm openings.

The summit is very slightly convex, and composed of unequal plates, the larger of which are tumid, and the smaller less convex. Extending from each arm, towards the middle, there is a depression occupied by smaller pieces, while the larger and more convex plates occupy the prominences between. The specimen examined being a little defective on one side, the exact position of the anal opening, if any exists, cannot be determined.

Height to top of first brachial pieces, 0.48 inch; do. to ambulacral apertures, 0.39 inch; do. to top of vault, 0.56. Breadth below the arms, 0.51 inch.

Locality and position.—Burlington Limestone of subcarboniferous series, Burlington, Iowa.

Genus ACTINOCRINUS, Miller.

ACTINOCRINUS VALIDUS.—Body of medium size, subglobose, being more depressed above than below the arms; calyx somewhat ventricose, and formed of thick, convex, radiately costate plates, connected by moderately distinct sutures; summit composed of small irregular tuberculose pieces, and provided

ambulacral openings may exist in the type of that genus, and that in consequence of the imperfection of their specimens, Messrs. Lyon and Casseday may have failed to see them. If so, all the species will probably have to be ranged under their name, which was first published, unless when the characters and limits of *Acanthocrinus* are better known, it may be found that these American forms should only constitute a section of that genus. Prof. Hall seems to have overlooked the almost exact identity in the generic formula of his group with that given of *Goniasteroidocrinus*.

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with a subcentral proboscis; interradial spaces between the arms deeply excavated. Base rather small, truncated and concave below, about four times as wide as high, not provided with a continuous rim; composed of somewhat unequal plates, with deeply grooved sutures between; columnar facet nearly two-thirds as broad as the base, concave, and marked by fine radiating striæ. First radial plates a little wider than high, two of them hexagonal, and three heptagonal, the angle at the middle of the lower side of each being very obtuse. Second radials wider than long, hexagonal and heptagonal, about one-half to two-thirds as large as the first radials, and like them ranging obliquely outward and upward from the base. Third radial pieces, smaller than the second, from which they extend almost horizontally outwards; arcuate transversely, their lateral extremities curving up to connect with the superior arm pieces, hexagonal, and each supporting on its superior (or more properly its outer) sloping sides two secondary radial pieces, which also extend out horizontally from the body.

The first anal piece is nearly as large as the first radials, about as wide as long, hexagonal, and supports on its superior sloping sides two smaller hexagonal and heptagonal pieces in the second range; above these there are in the next range, three or four smaller pieces, which connect with the vault and superior arm pieces above and on each side. The first interradial plates are about the size of the second radials, as long as wide, heptagonal (and hexagonal) and support two or three smaller pieces in the next range.

Of the distinct radiating costæ on the first radial plates, from three to four pass across from one to the other, and from each to the base, and one or two to the second radial, and each first interradial above; while the third radials are destitute of costæ.

Height from base to summit of third radials, 0.65 inch; do., to top of vault, 0.95 inch; breadth (across between the arms) 0.91 inch; breadth of base 0.42 inch; height of do., 0.12 inch.

Locality and position. Cedar Creek, Warren County, Illinois. Burlington Limestone of lower carboniferous series.

ACTINOCRINUS ASTERISCUS.—Body about medium size, depressed or subdiscoidal, rather more convex below than above the arms; calyx expanding rapidly from the base about half way up, then flaring outwards so as to bring the third radials and succeeding pieces nearly upon a horizontal plane, composed of thin, nearly smooth flattened plates, which are joined by close fitting sutures; summit much depressed, consisting of numerous medium-sized, convex plates, and provided with a subcentral proboscis; interradial spaces deeply excavated, so as to give the body a distinctly pentalobate outline, as seen from above or below. Base small, apparently rounded and destitute of a marginal rim, about three times as wide as high. First radial plates wider than long, expanding from below to the lateral angles, three of them hexagonal, and two heptagonal, the angle at the middle of the base of the latter being very obtuse. Second radials small, about twice as wide as long, hexagonal and pentagonal. Third radials slightly larger than the second, pentagonal, or occasionally hexagonal about twice as wide as high, and each supporting on its superior (or more properly, outer) sloping sides, two secondary radials; these are each succeeded by another, which in its turn, supports two of the first brachial pieces, making four arms to each ray, or twenty in the whole series, all of which seem to rise vertically from the point of attachment.

The first anal piece is small, longer than wide, hexagonal, and supports on each superior lateral edge a small pentagonal piece, and on its truncated upper end a long, narrow, irregular plate, which extends up and curves inwards with its superior extremity between two of the crown plates. On each side of the latter there is a large irregular curved piece, belonging, probably, to the anal series. The first interradial plates are larger than the first anal piece, and as wide as, or wider than long, hexagonal or heptagonal, and each supports on its superior lateral sloping edges smaller pieces, above which

there are usually three, or occasionally four, irregular elongated pieces, similar to the upper of the anal series. Sometimes the middle one of these three pieces extends down between the others, so as to rest upon a short, truncated, upper end of the first interradial piece. (Other parts unknown.)

Height from base to top of vault, 0.47 inch; do. to arms, 0.37 inch; breadth across, from side to side, between the interradial 0.66 inch.

Locality and position. Same as last.

ACTINOCRINUS SPECIOSUS.—Body large, below the arms obconical, longer than wide, composed of convex, ornately costate plates, which are joined by more or less excavated sutures. Base of moderate size, cup-shaped, nearly as wide again as high, truncate below, and expanding rather rapidly upward, composed of regular subequal hexagonal plates, with broadly and deeply grooved sutures. Columnar facet rather large, or nearly equaling one-half the breadth of the base, flat, marked by obscure radiating striæ, and provided with a very small continuous rim; perforated by a round central opening about one-third the diameter of the column at its junction with the body. First radial plates large, longer than wide, three hexagonal, and two heptagonal, generally widest a little above the middle. Second radials considerably smaller than the first, about as wide as long, and apparently all hexagonal. Third radials a little smaller than the second, wider than long, heptagonal, (and octagonal?) each supporting on its superior sloping sides two smaller heptagonal or octagonal secondary radials, which appear to have each supported two brachial pieces; resting upon and between the two secondary radials, there is a small hexagonal interbrachial piece, which appears to have supported two others on its upper sloping sides.

The first anal plate, which is nearly as large as the first radials, is heptagonal, longer than wide, and supports in the first range three much smaller pieces, the middle one of which, is pentagonal, and the others hexagonal; above these in the next range, there are four, and in the third, apparently three pieces, which is as far as they can be traced in the specimen examined.

The first interradial plates are slightly larger than the second radials, hexagonal, and each surmounted by two smaller pieces; above these there are, apparently, about three other ranges of two small pieces each.

The surface of the plates is neatly ornamented by narrow, sharply elevated ribs, about four to six of which radiate from the central region of each first radial plate to each of its sides, excepting below the middle, where there are usually about eight to ten. The costæ on the other plates are less numerous in proportion to the size of each, and like those on the first radials, extend to the sides, those crossing any one side being all arranged parallel to each other so as to form with those on the adjacent plates a series of concentric equilateral triangles. Sometimes these costæ are irregularly interrupted, or more or less notched, especially on the upper plates; and on some of the upper interradial pieces they show a tendency to become irregularly broken up into little spine-like projections.

Locality and position. Three miles west of Burlington, Iowa. Burlington Limestone of the subcarboniferous series.

ACTINOCRINUS SCHULTZ.—Body rather under medium size, unsymmetrically urn-shaped, the summit being moderately convex, and the calyx below the arms obconical, with a truncated base; expanding regularly with straight sides from the base to the third radials, above which the secondary radial, and first brachial pieces extend out horizontally, leaving excavated interradial spaces between the clusters of arms; sutures close fitting. Base of moderate size, more than twice as wide as high, truncated, and distinctly concave below, where it is as wide as at the summit; margin so deeply notched at the sutures as to present a distinctly trilobate appearance as seen from below; columnar facet rounded, about one-third as wide as the base, and provided with a minute central perforation. First radial pieces a little wider than long, two of them heptagonal, and three hexagonal, widening upwards from the base to

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the lateral angles, and each having a very prominent, compressed, central node extending obliquely outwards and downwards, from which one or two moderately prominent ridges pass down upon the basal plates. Second radials between one-half and two-thirds as large as the first, distinctly convex, or each rising into a small node; about one-third wider than high, two of them pentagonal, and three hexagonal. Third radials as wide as the second, but rather shorter, three of them pentagonal and two heptagonal, supporting on each of their superior sloping sides a slightly smaller secondary radial piece, each of which is surmounted by two brachial pieces; making, apparently, twenty arms in the entire range.

The first interrarial pieces are about as large as the second radials, and like them provided with a central node; they are as long as wide, regularly hexagonal, and support on their superior sloping sides two smaller pieces in the second range, and two or three in the third, which connect on each side with the secondary radial, and first brachial pieces. The first anal plate is nearly as large as the first radials, as long as wide, hexagonal, and supports in the second range, two rather smaller pieces, one of which is hexagonal, and the other heptagonal; above these there are two others, which connect with the third radials, and secondary radial pieces on each side, and are surmounted by two or three small, irregular pieces, which are flanked on either side by the brachial pieces, and connect with those of the summit above.

The vault is composed of irregular, moderately convex pieces, of various forms, and provided with a subcentral proboscis, which rises abruptly from its surface.

Height from the base to the summit of the vault, 0.66 inch; do. to top of third radials on the anterior side, 0.44. Breadth of base, 0.34 inch; height of do., 0.14 inch; breadth across the summit, between the interrarial spaces on opposite sides, 0.61 inch.

Locality and position. Cedar Creek, Warren County, Illinois. Burlington Limestone, of the subcarboniferous series.

ACTINOCRINUS ARANEOLUS.—Body small, much depressed, stelliform, nearly equally convex above and below the arms, with deeply excavated interrarial spaces; composed of smooth or obscurely granulose, convex plates, which are strongly angular below the arms; sutures moderately distinct. Base small, flat and subhexagonal; columnar facet small, round, flat, and about one-third as wide as the base, pierced by a small central opening. First radial pieces on a plane with the base, strongly convex, and angular in the middle, from which a more or less angular ridge radiates to each of the sides, all slightly broader than long, and hexagonal or heptagonal, the seventh angle at the middle of the side connecting with the base being very obtuse. Second radial pieces nearly as large as the first, wider than long, distinctly curved upwards at the sides, and subangular along the middle; presenting a hexagonal outline as seen from below, but possessing an additional angle on each side, only seen in a lateral view. Third radials of the same size as the second, from which they extend horizontally outwards; curving distinctly upwards on each side, and pentagonal as seen from below, but each having one or two additional angles on each side, where they connect with the superior arm pieces extending out from the vault; supporting on their superior, or more properly outer, sloping sides apparently the first brachial pieces.

The interradians are about two-thirds as large as the first radial pieces, a little longer than wide, regularly hexagonal, and each support on their superior sloping sides two smaller pieces, which seem to belong more properly to the vault, than the interrarial series.

The first anal plate is near two-thirds as large as the first radial, hexagonal, and supports two smaller hexagonal pieces in the next range; above these there are four others in the third range, which connect with those of the vault above, and with the superior arm pieces on each side.

The summit is composed of small, somewhat irregular pieces, some of which

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are tumid, and a few that extend out over the third radials become subconical. The proboscis is subcentral, of medium size, and rises abruptly from the much depressed vault. (Other parts unknown.)

Height, 0.22 inch; breadth across the disk, between the interrarial spaces on opposite sides, 0.33; do., between the third radials on opposite sides, 0.54 inch; breadth of base, 0.14 inch.

Locality and position. Burlington, Iowa. Burlington Limestone, of the subcarboniferous series.

ACTINOCRINUS (AMPHORACRINUS) SUBTURBINATUS.*—Body rather under medium size, turbinate, or obconical below the arms, and depressed convex above; expanding regularly with straight sides from the column to the summit of the third radials, thence more abruptly to the arms; composed of flat, smooth or merely granulose plates, which are connected by close-fitting sutures. Interrarial and anal spaces rather distinctly excavated between the groups of arms. Base comparatively small, subpentagonal, about one-third as wide as high, and not provided with a projecting rim; columnar facet concave, small or less than half the diameter of the base. First radial plates generally a little wider than long, widening from the base to the lateral angles, two of them heptagonal and three hexagonal. Second radials small, about twice as wide as high, quadrangular, or rarely with one of the upper angles slightly truncated so as to produce a fifth angle. Third radial pieces a little larger than the second, about twice as wide as high, hexagonal and heptagonal, and supporting on each superior sloping side in the anterior and two posterior rays, one (occasionally two on one side of the latter) small secondary radial piece, which gives rise to two brachial pieces; while in each of the two antero-lateral rays, the two small secondary radials are truncated above, and each supports a single brachial piece; making two arms to each of these rays, and four to each of the others, or sixteen to the entire series.

The first interrarial plates are about two-thirds as large as the first radials, nearly as long as wide, and six to nine-sided. On the superior sloping sides of these, rest two smaller pieces, which partly support the secondary radials, and are surmounted by two or three irregular pieces, which extend up between the groups of arms. The first anal piece is as large as the first radials, about as long as wide, heptagonal, and surmounted by three smaller hexagonal pieces in the second range, the middle one of which extends above the others. Surmounting these there are also three pieces in the third range, the two lateral of which each supports an irregular piece above, while the middle one projects considerably beyond the others, and supports on its sloping sides a series of protuberant plates, which surround the small anal aperture.

The summit is composed of irregular unequal plates, one of which over each arm, and another near the middle, are larger than the others, and appear to have been convex, or may even have been extended into short spines. The anal aperture is lateral, being located a little above the elevation of the arm openings.

Height from base to summit, 0.59 inch; breadth across the summit between the groups of arms, 0.60 inch; do., from the arm openings on opposite sides,

* We think Austin's name *Amphoracrinus* should be retained, at least in a subgeneric sense. The lateral position of the anal and oral opening in this group, instead of having it placed in or near the centre of the vault, and extended in the form of a more or less elongated proboscis, must have been accompanied by some marked difference in the structure of the softer parts of the animal. Indeed it seems to us that in the classification of the *Crinoidea*, too much importance is often given to the number and arrangement of the pieces forming the cup, to the neglect of the *ensemble* of characters presented in the structure of all parts of the animal. When we see what widely dissimilar species are sometimes brought together in the same groups, by the present classification, we cannot avoid suspecting that it is, as now used, at least to some extent, analogous to the old artificial Linnæan classification in botany, and that it will some day give way to a more rational method that may make material modifications in the genera as we now understand them.

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0.73 inch; breadth of base, 0.27 inch; height do., 0.07; height from base to anal opening, 0.46 inch.

Locality and position. Same as last.

Genus FORBSIOCRINUS.*

FORBSIOCRINUS? NORWOODI.—Body (as near as can be determined from a compressed specimen) obconical, or enlarging regularly upwards from the column; composed of nearly smooth, rather thick, flattened, or more or less arcuate plates, which are connected by linear sutures. Base small, and apparently nearly hidden by the column. Subradial plates rather irregular in form, four of them pentagonal, (one of the sides being very short) and one on the anal side apparently heptagonal, with unequal sides. First radial pieces nearly twice as wide as long, hexagonal and heptagonal, and a little arcuate transversely. Second, third and fourth radials, (and in the anterior ray the fifth,) all short, nearly of the same size, hexagonal and about twice as wide as long. Fifth radial pieces (sixth in the anterior ray) of the same size as the others, heptagonal, and supporting on their superior sloping sides the secondary radials, only three ranges of which have been seen; these latter alternate with interradians on each side, and show scarcely any tendency to diverge. (Anal pieces unknown).

Of the interradians, which are numerous, the first are nearly as large as the subradials, as long as wide, hexagonal, and support three smaller pieces in the second range. Above these four are seen in the next range, in one interradian space, which is as far up as they can be counted in the specimen examined, though it is evident from the breadth of the interradian spaces that they must increase in number at the same rate for several ranges above.

The column is round, comparatively thick at its connection with the base, from which it tapers towards the lower extremity. It is made up of extremely thin segments, which fit together by interlocking crenulations, formed doubtless by distinct radiating striæ on their upper and lower surfaces. Its central cavity is subcircular, and nearly equal to one-third the diameter of the column, at a distance of one inch below its connection with the base.

Named in honor of Prof. J. G. Norwood, of the University of Missouri.

Locality and position. Near Nauvoo, Illinois. Keokuk Limestone of sub-carboniferous series.

FORBSIOCRINUS? SEMIOVATUS.—Body below the first bifurcation of the rays, narrow semioval, a little wider than long, expanding rapidly from the base to the summit of the first radial pieces, above which it widens very gradually, or becomes nearly cylindrical; composed of moderately thick, smooth, or subgranulose plates, united by distinct sutures. Basal plates (as defined in this genus by Prof. Hall†) hidden by the column, if they exist. Subradials (of Hall, basal of Koninck and LeHon), of moderate size, wider than long, three of them on the anterior side pentagonal, the two upper sloping sides being considerably longer than the lateral margins; (the other two unknown). First radial plates on the anterior side, heptagonal, wider than long, the superior truncated edge being longer than either of the others. Second radials smaller than the first, hexagonal, and nearly twice as wide as long. Third and fourth radials, a little smaller than the second, wider than long, and quadrangular, or obscurely hexagonal, excepting in one ray where there are only four pieces, the last of which is pentagonal, or obscurely heptagonal, and supports the arms; in each of the other two rays seen, there is a fifth piece, which seems to be pentagonal, and supports the arms on its superior sloping sides. (Anal and interradian pieces unknown.)

* The two species we have here referred provisionally to the genus *Forbsiocrinus*, will probably be found to possess the characters of *Onychocrinus* of Lyon and Casseday; but as we have not yet seen the basal plates of either, we do not feel quite warranted in separating them from *Forbsiocrinus*.

†See Iowa Report, p. 630.

The arms above the first division on the fourth and fifth radials, consist of a single series of pieces, are rounded on the outside, and a little broader than their diameter at right angles to their outer surface. One of them is seen to bifurcate again on the sixth piece, and another on the eighth, beyond which they are not known to divide again. Between each two of the arm pieces, as well as the primary radial plates, the minute accessory patelloid pieces, pointed out by Prof. Hall in other species of this genus, are distinctly seen.

The column is comparatively large, near the body, tapers a little downwards, and is composed, for a short distance below its connection with the base, of extremely thin segments, which fit together by distinct interlocking crenulations around the margins; and a little farther down they gradually become alternately thicker and thinner. A transverse section shows the central cavity to be comparatively large, and distinctly pentapetalous as thus seen.

Height from the base to the top of the first radials 0.19 inch; do. from base to top of fifth radials 0.41 inch; breadth at the summit of the first radials 0.35 inch; breadth of base 0.15 inch.

Locality and position. Hardin County, Illinois. St. Louis Limestone of subcarboniferous series.

Genus ZEACRINUS, Troost.

ZEACRINUS DISCUS.—Calyx below the summit of the first radial plates small, subdiscoidal, or depressed, basin-shaped, about three times as wide as high, composed of smooth, very slightly convex plates, which are connected by moderately distinct sutures. Base small, flat, and pentagonal; columnar facet equalling about two-thirds the diameter of the base, round, concave, and marked by distinct radiating striae, perforated by a round, minute central aperture. Subradial plates extending nearly horizontally outward from the base, so as to form a distinct pentagonal, star-shaped disk, all curving a little upwards towards their outer extremities; three of them pentagonal, and two hexagonal, in consequence of each having one angle slightly truncated by the anal pieces. First radial plates about twice as large as the subradials, rather more than half as long as wide, pentagonal, and all transversely truncate above, the upper side being longer than either of the inferior sloping edges, which are longer than the lateral margins.

The first anal plate is elongate pentagonal, and wedged down between one of the subradials, and the inferior sloping side of one of the first radial plates, its lower extremity resting upon a very short side of another subradial. Of the second anal pieces there are two, one of which stands upon the short truncated superior side of one of the subradials, and is supported on its right inferior sloping side by the first anal piece, and on the left by one of the first radials; the other stands upon the upper end of the first anal piece, being also partly supported on the right by one of the first radial plates, and on the left by the other second anal piece. Both the second anal plates project about half their length above the summit of the first radials. (Remaining parts unknown.)

Height to the summit of the first radial plates, 0.17 inch; breadth 0.46 inch; breadth of base 0.14 inch.

Locality and position. Sangamon county, Illinois. Upper Coal Measures.

ZEACRINUS TROOSTANUS.—Body rather small, depressed, basin-shaped below the arms, somewhat rounded and concave on the inner side, composed of apparently smooth plates, which are connected by linear sutures. Base very small, concave, and nearly or quite hidden by the column. Subradial plates unequal in size, a little wider than long, excepting the one on the anal side, four of them pentagonal, and one, which is longer than the others, heptagonal, (counting the part of each connecting with the base, as one side.) First radials nearly twice as wide as high, pentagonal, the superior horizontally truncated edge being longer than either of the inferior sloping sides. Second

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radial plates slightly larger than the first, wider than long, pentagonal, and indistinctly hexagonal; all longer on the inferior truncate side than either of the others; apparently four of them supporting on their superior sloping sides the first divisions of the arms, while the one on the anterior side is truncated above, and succeeded by three other very short, wide pieces, upon the last of which the first divisions of the arms rest.

Only two of the anal pieces are seen in the specimen examined; one of these, which is small, occupies a position partly between the right superior sloping side of the largest subanal piece, and the left inferior sloping side of one of the first radials. The other connects with this on the left, and rests upon the left upper sloping side of the large subradial piece, being apparently flanked on its left side by one of the first radial pieces.

The arms are nearly flat, or but slightly rounded on the outer side, and bifurcate again, after the first division on the second radial pieces (in the lateral and posterior rays), on the eighth, tenth, and eleventh pieces, and one of the subdivisions again divides on the twelfth or fourteenth piece, beyond which they are all simple.

Named in honor of Dr. G. Troost, deceased, former State Geologist of Tennessee.

Locality and position. Cedar creek, Warren county, Illinois. Burlington Limestone, of subcarboniferous series.

ZEACRINUS PLANOBRACHIATUS.—Body small, depressed, basin-shaped, concave below, rapidly expanding upwards, composed of apparently smooth plates, connected by moderately distinct sutures. Base small, and placed within the concavity of the under side; columnar facet very small. Subradial pieces as wide as long, or a little wider, four pentagonal, and one on the anal side hexagonal, having one angle slightly truncated. First radial pieces wider than long, expanding from the base, pentagonal, the upper side being horizontally truncated, and longer than either of the others. Second radial pieces nearly as large as the first, presenting a triangular outline (in the posterior and lateral rays), the lateral angles being probably truncated; supporting on their superior lateral sloping sides the first divisions of the arms. First anal plate narrow below, and wedged down obliquely between one of the subradials and the inferior sloping side of a second radial; supporting another piece on its left superior sloping side, and apparently a smaller one on its narrow truncated upper extremity.

The arms are rather flattened on the outer side, and after the first division on the second radial pieces (those seen), bifurcate again on the fifth and sixth pieces. Beyond this they are entirely simple, and composed of a single series of pieces, which are slightly wider than long, and alternately longer and shorter on opposite sides. On the longer side they project a little above, for the reception of the tentacles, which are composed of joints nearly twice as long as wide.

Height from base to summit of first radials, 0.13 inch; breadth at the top of first radials, 0.27 inch; length of arms, from their division on the second radial pieces, about 0.94 inch; length to bifurcation on the sixth piece, 0.19 inch.

Locality and position. Monroe county, Illinois. Keokuk Limestone of lower carboniferous series.

Genus CYATHOCRINUS Miller.

CYATHOCRINUS SAFFORDI.—Body subglobose, wider than high, the broadest part being below the middle, unsymmetrical, the anal side being longest, and most gibbous; composed of thin, smooth plates, joined by slightly raised, linear sutures. Base of moderate size, irregularly pentagonal, flat, or so slightly convex as to be scarcely seen in a lateral view, consisting of unequal, sub-hexagonal plates, the lateral and outer margins of which are nearly equal, while the side next the column is so short as to appear to terminate in an 1860.]

angle; columnar facet very small, and slightly projecting. Subradial plates rather large, wider than high, four of them hexagonal (the inferior angle being very obtuse or nearly obsolete), and one on the anal side, which is considerably larger than the others, irregularly heptagonal. First radial plates about the size of the subradials, somewhat unequal, hexagonal, generally wider than long, and tapering upward from the inferior lateral angles, bordered above by a slender, slightly reflexed rim; sinus in the superior edge, for the reception of the second radial piece, small. Anal plate small, about as wide as high, quadrangular, and, like the first radials, provided with a marginal rim; not projecting above the radial plates on each side of it.

Height to summit of first radials, 0.44 inch; greatest breadth, 0.67 inch; breadth of base, 0.45 inch.

Dedicated to Prof. Safford, State Geologist of Tennessee.

Locality and position. White's creek, Tennessee. Keokuk Limestone.

CYATHOCRINUS? SANGAMONENSIS.—Body beneath the summit of the first radial pieces semi-ovate, composed of thick, moderately convex, smooth plates, which are joined by strongly defined punctured sutures. Base pentagonal, equalling about half the breadth of the body, convex, and formed of equal pentagonal pieces, which are a little wider than long; columnar facet round, deep, and about one-third as wide as the base. Subradial pieces large, as wide as long; three of them hexagonal, with their superior sloping sides slightly longer than their lateral margins, which are longer than the basal edges; and the other two heptagonal, with unequal sides. First radials wider and shorter than the subradial pieces, about twice as wide as high, pentagonal, and of nearly equal size and form; their upper sides being horizontally truncate, straight or slightly concave, and considerably longer than either of the basal sides, which are much longer than the vertical lateral edges.

The anal plate is comparatively small, longer than wide, and projects somewhat above the summit of the first radials. It seems to be irregularly heptagonal or octagonal, but the exact form of its upper extremity is not distinctly seen in our specimen. Its base rests upon the short upper truncated extremity of one of the irregular heptagonal subradial plates, while on either side it connects with the first radials, and is supported on its right inferior sloping margin by a large oblong quadrangular subanal piece. This subanal plate is larger than the anal piece, and rests upon the superior sloping edges of the two heptagonal subradials, while its upper oblique side supports one of the inferior sloping sides of the first radial plates, on the right of the first anal piece. Arms, summit, and column unknown.

Height from the base to top of first radial pieces, 0.94 inch; breadth about 1.25 inches; diameter of columnar facet, 0.24 inch; breadth of base, 0.64 inch; height and breadth of subradials, 0.60 inch; height of first radials, 0.36 to 0.40 inch; breadth of do. about 0.68 inch.

Locality and position. Sugar creek, Sangamon county, Illinois. Upper Coal Measures.

CYATHOCRINUS? CRASSUS.—Body below the summit of the first radial plates depressed, or basin-shaped, about twice as wide as high, rounded or subtruncate below, and composed of smooth, strong, thick, slightly convex plates, which are joined by well defined, punctate sutures. Base very small, or about one-fourth the breadth of the body, pentagonal, concave, and apparently nearly hidden by the column. Subradial plates a little wider than high, extending at first nearly horizontally outwards from the base, after which they curve obliquely upwards, four of them hexagonal, and one on the anal side heptagonal; the angle at the middle of the base of each being but slightly salient. First radial plates larger than the subradials, nearly twice as wide as high, truncated horizontally, and nearly or quite straight on the upper side, which is longer than the inferior sloping edges; four of them pentagonal, and one on the left of the anal piece hexagonal.

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The anal piece is small, apparently pentagonal, and projects distinctly above the summit of the first radials, with which it connects on each side. Instead of resting directly upon the upper side of one of the subradials, it is supported on the upper slightly oblique truncated extremity of a very large pentagonal subanal piece, which rests upon the upper sloping sides of two subradial pieces, and supports the inferior sloping edge of a first radial plate on each of its oblique lateral margins.

Height from the base to the top of the first radial pieces, 0.45 inch; breadth, 0.90 inch; breadth of base, 0.23 inch; length of subradials, 0.36 inch; breadth of do. from 0.36 to 0.40 inch; length of first radials, from 0.28 to 0.30 inch; breadth of do. from 0.35 to 0.49 inch.

This, and the last species, together with such forms of *C. spurious*, *C. intermedius*, and *C. ? pentalobus*, Hall, should probably form a subgenus, bearing close relations both to *Poterocrinus* and *Cyathocrinus*.

Locality and position. Ovan, Fulton county, Illinois. Lower Coal Measures.

CYATHOCRINUS SCITULUS.—Body below the summit of the first radial plates basin-shaped, about twice as wide as high, and truncated at the base, from which it expands rapidly upward; composed of thick, strong, subgranular plates, which are very convex in the middle, and deeply excavated at the corners; sutures moderately distinct. Base small, flat or truncate, on a plane with the prominent portion of the subradials, so as not to be seen in a side view; columnar facet a little concave, occupying about two-thirds the area of the base, and perforated by a central opening equal to one-third its own diameter. Subradial pieces about as wide as long, directed obliquely outward and upward from the base; four of them pentagonal and one hexagonal, there being no visible angle at the middle of the under side in any of them. First radials much larger than the subradial pieces, about twice as wide as high, unequal, two on the anal side being shorter than the others; all pentagonal, distinctly truncate, and a little concave above, the upper side being much longer than either of the others; superior angles also slightly truncated for the reception of small interradians. Anal piece small, subquadrangular, widening from the base upwards, and projecting above the first radials.

The very prominent central portions of the subradial pieces are truncated below, on a plane with the base, and project out horizontally from it in such a manner as to form with the base a distinct five-rayed star, as seen from below. From near the middle of each subradial, there is a rather obscure angular ridge extending along each side of its prominent central portion to the basal pieces, and another connecting with a similar ridge near the edge of each first radial plate above. From the obliqueness of the upper truncated side of the first radial pieces, it is manifest that the other radials must have extended very obliquely outward from them.

Height to summit of first radials, 0.32 inch; breadth 0.66 inch; breadth of base, 0.21 inch; length of subradials, 0.21 inch; length of largest first radial pieces, 0.20 inch; breadth of do. 0.36.

Locality and position. Burlington, Iowa. Burlington Limestone of subcarboniferous series.

CYATHOCRINUS ANGULATUS.—Body of medium size, somewhat basin-shaped below the arms, wider than high, truncated below, and rapidly expanding upwards; composed of very thick, nearly smooth, tumid, angular plates, which are united by distinct sutures. Base small, and apparently projecting a little below the base of the subradials. Subradial plates as wide as high, four of them pentagonal, and one on the anal side hexagonal, there being no visible angle in the middle of any of them below. First radials larger than the subradial pieces, about twice as wide as long, pentagonal, or subheptagonal, the upper angles being sometimes slightly truncated; all broadly truncate, and a little concave above. Second radial pieces extremely short, but differing

somewhat in length. Third radials larger than the first, considerably wider than long, unequal, and presenting a triangular outline, the under side being longer than either of the others; supporting on their superior sloping sides the first divisions of the arms. Anal piece smaller than the subradials, a little narrower below than above, apparently pentagonal, though the upper side is not distinctly visible in the specimen described; extending partly above the summit of the first radial plates.

The arms are large, rounded, apparently simple, after the division on the third radial piece, and composed of a single series of pieces, which are wider than long, and alternately a little longer and shorter on the opposite sides.

The plates below the second radial series are remarkable for their thickness, and tumid, angular character, though the angles are not acute. On the subradials two of these angles or ridges pass from the middle to the base, nearly parallel to each other, and one to each of the first radial pieces above. On the first radials there are two of these angles, both of which pass from above obliquely to the base, where they connect with those on the subradial pieces, giving to each first radial a bilobate appearance,

Locality and position. Nauvoo, Illinois. Keokuk Limestone of lower carboniferous series.

Genus POTERIOCRINUS, Miller.

POTERIOCRINUS (SCAPHIOCRINUS) DECACTYLUS.—Body rather small, broad, obconical below the arms, expanding rapidly from the base; plates somewhat thick, nearly smooth, not convex, and connected by moderately distinct sutures. Base small, convex, or about half as high as wide, pentagonal in outline as seen from below, the upper angles of the plates being rather salient. Subradial plates somewhat unequal, a little wider than long, four of them hexagonal, and one on the anal side heptagonal; the upper sloping sides in all longer than those beneath, which are longer than the lateral margins. First radial plates about twice as long as the smaller of the subradials, four of them pentagonal, and one hexagonal, all wider than long, and wider on the upper horizontally truncate side than either of the others. Second radials about the size of the first, pentagonal, a little wider than high, truncated below, and provided with a salient angle in the middle above; supporting the arms on their superior sloping sides, which are longer than the lateral margins.

The first anal plate is large, or equalling some of the subradials in size. It is irregularly hexagonal in form, and rests between the superior sloping sides of two of the subradials, supporting on its right (longest) sloping side an inferior edge of one of the first radial pieces, and connecting on the left by a short vertical edge, with another first radial plate. On its upper sides it supports two smaller pieces in the second range, the exact form of which cannot be made out in the specimen examined.

The arms are long, large, and robust, subcylindrical, rather unequal, and appear to be all simple from their division on the second radial piece. They are entirely composed of a single series of pieces, a few of the first of which are longer than the others, and alternately longer and shorter on opposite sides; further up they are more regular, and shorter than wide. The column is rather small, or less than the diameter of the largest arms; it is round, and composed of thin, slightly unequal segments near the body. Its central cavity is small, and presents a regular pentapetalous section.

Height of body from base to the summit of second radials, 0.48 inch; breadth about 0.47; length of arms, apparently not less than 2.50 inches; breadth of do. from 0.11 inch to 0.16 inch.

Locality and position. Appanoose, Hancock county, Illinois. Keokuk Limestone, of subcarboniferous series.

POTERIOCRINUS SWALLOWI.—Body of medium size, obconical, or tapering regularly from above to its connection with the column; composed of smooth,

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nearly flat plates, which are connected by moderately distinct sutures. Base basin-shaped, truncate below, and expanding gradually upward, about half as high as wide, and composed of nearly equal pentagonal pieces; columnar facet large, concave, without a projecting marginal rim, pierced by a pentapetalous central opening, less than one-third the diameter of the column. Subradial plates unequal, some of them as long as wide, and others wider than long, three hexagonal, and two of the larger ones on the anal side, heptagonal, First radials rather smaller than the subradial pieces, all wider than high, pentagonal, somewhat unequal, and horizontally truncate above, the upper side being longer than either of the inferior sloping sides, which are longer than the lateral margins. Second radial pieces very short, apparently subquadrangular. Third radials short, or about three times as wide as high, pentagonal, and supporting on their superior sloping sides the main divisions of the arms.

The first anal piece is pentagonal, and rests between the two upper sloping sides of two subradials. On the right it supports one inferior sloping edge of a first radial plate, and connects with another anal plate on the left, which rests on the superior truncated end of one of the subradials. Both of these anal pieces are truncated above, and surmounted by two others, the former of which cannot be made out in the specimen described.

The arms are very long, robust, rounded, and after the first division on the third radial piece, bifurcate again on the eighth, ninth, and eleventh pieces, in three of the arms examined, above which they seem to be simple, and are each composed of a single series of pieces. The column is composed, near the body, of firmly ankylosed pieces, the sutures of which are not visible 0.20 inch below its connection with the base. Its central cavity presents, in a transverse section, the same pentapetalous form as the perforation of the base.

Length from base to summit of third radial plates, 0.79 inch; breadth about 0.62 inch; breadth of base, 0.38 inch; height of do. 0.19 inch; length of arms, about 3.50 inches.

Named in honor of Prof. G. C. Swallow, State Geologist of Missouri.

Locality and position. Burlington, Iowa. Burlington Limestone of the subcarboniferous series.

ECHINOIDEA.

Genus ARCHÆOCIDARIS, McCoy.

ARCHÆOCIDARIS MUCRONATUS.—The only specimens of this species yet obtained, consist of detached primary spines, and a few of the interambulacral plates. The plates are hexagonal, wider than long, and apparently nearly smooth, or only ornamented by a single row of small tubercles around the margin. Central tubercle prominent, and nearly equalling one-third the greater diameter of the plate, most elevated in the middle, which has a small central pit, and is separated from its surrounding lower margin by a distinct annular groove.

Primary spines long, tapering, a little compressed, or nearly round, and very slightly curved above the articulating extremity, near which they swell out so as to form a distinct, smooth, somewhat angular ring; from this to the articulating end, they contract abruptly; pointed at the upper extremity, and armed by rather strong, sharp, but short lateral spinules, which are directed obliquely outwards and upwards. Even under a magnifier the entire surface generally appears to be smooth, but when a well preserved specimen is examined with a good lens, in a favorable light, it is seen to be marked by extremely fine, obscure, closely arranged, longitudinal striae. The articulating end is distinctly perforated, and transverse sections show the central cavity to be comparatively large for some distance above.

Length of one of the interambulacral plates, 0.50 inch; breadth of do. 0.35 inch. Length of primary spine, 2.62 inches; greatest diameter of same above

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the head, 0.17 inch; diameter of head, 0.22 inch; length of lateral spinules, 0.10 inch.

Locality and position. Liberty, Randolph county, Illinois. Upper bed of Chester Limestone. Lower carboniferous series.

Genus *PALECHINUS*, McCoy.

PALECHINUS BURLINGTONENSIS.—The only specimen of this species we have yet seen is too imperfect to show the exact form of the entire fossil, though it seems to have been nearly spherical. It has four to five ranges of interambulacral plates near the middle of each area, and they decrease in number to three, two, and apparently at last to one at each extremity. The inner pieces are wider than long, and regularly hexagonal, excepting near the upper and lower extremities of the spaces, where they are about as long as wide, and occasionally pentagonal; those of the outer ranges are all pentagonal, their outer margins being truncate, and crenulated for the reception of the small ambulacral pieces.

The ambulacra are narrow, or about as wide as the first range of interambulacral plates on either side, slightly convex along the middle, and a little concave at the margins. They are composed of a double alternating series of very small pieces, which are two or three times as wide as long; about five to seven of them equalling the height of each contiguous interambulacral plate. They are each pierced by two small rounded pores near the outer margin, and all of nearly uniform size towards the extremities of the ambulacral areas, but in the central or widest part they become alternately wider at the inner and outer extremities; those having their narrower end outwards often wedging out to a point between the others before reaching the margin of the ambulacral space.

The surface of all the plates is ornamented by numerous regularly arranged granules, two of which occupy the inner half of each ambulacral piece.

As near as can be determined from our specimen, it must have been, when entire, not less than 2.25 inches in length, and about 2 inches in breadth. The largest interambulacral plates are 0.19 inch wide, and 0.17 inch in height; breadth of widest part of ambulacra.

Locality and position. Burlington, Iowa. Burlington Limestone of the lower carboniferous series.

Genus *MELONITES*, Owen and Norwood.

All the published figures of *Melonites multipora*, the type, and hitherto the only known species of this genus, give a very incorrect idea of the form and arrangement of its ambulacral pieces and pores. The three lateral series of these pieces on each side of the two middle ranges, instead of being as represented, composed two of quadrangular, and one of pentagonal pieces, placed in oblique transverse rows, and mounted one upon another so as to form at the same time regular longitudinal ranges, are made up of irregular alternating unequal pieces of various forms. They are also wedged in between each other in such manner, and so interrupted by small intercalated pieces, not properly belonging to either range, that it becomes very difficult to determine whether we should count them as four or as five rows, on each side of the mesial suture; or, in other words, as eight or ten rows to each ambulacrum. The same irregularity also occurs in the pores, which are round, in closely approximated pairs, and not arranged in regular longitudinal or transverse lines, but so as to show a tendency to assume a quincunx arrangement.

Should the genus of *Polypi*, to which Lamarck first applied the name *Melonites*, be retained, it will become necessary to give another name to the group now under consideration, in which case we would propose to call it *Melonechinus*. Although related to *Palechinus* of McCoy, this genus is clearly separated by the number and arrangement of its ambulacral pieces and pores, as well as by

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its more numerous and greatly thicker interambulacral plates. The much broader and more deeply sulcated ambulacral areas of the two species now known, also give them a peculiar melon-like form, quite unlike any of the known species of *Palæchinus*.

MELONITES DANÆ.—Test large, subglobose, apparently slightly longer than wide. Interambulacral areas lance-oval in form, convex, and occupied by eight ranges of plates near the middle, where all, excepting those of the two outer ranges are a little wider than high, and regularly hexagonal; towards the upper and lower extremities of these spaces, the plates diminish in size and numbers, and become proportionally higher, a few of them assuming a pentagonal, or even a rhombic quadrangular outline. Those of the two lateral ranges all subpentagonal, their outer margins being somewhat rounded, and more or less indented for the reception of the outer extremities of the small ambulacral pieces. Plates apparently all of uniform thickness, the larger ones being about as thick as high, while the thickness of the smaller greatly exceeds their diameter in any other direction. Ambulacral areas about half as wide as the interambulacral spaces, convex in the middle, and broadly, as well as rather deeply sulcate along each side. Ambulacral pieces in four ranges, with some irregular intercalated smaller pieces between; those of the different ranges alternating, and all wider than high, as well as quite irregular in form and size. Those composing the two inner ranges generally four or five times as wide as high, but varying considerably in height. Usually about four to five of the outer ranges, (which are of the same height, but only half as wide as the inner,) equal the height of each of the contiguous lateral interambulacral plates.

The intercalated pieces start from the zigzag suture between the two outer ranges of ambulacral pieces, and extend outward and inward between them, but wedge out, or terminate abruptly, before reaching the outer margins, or the middle of the ambulacral areas. The pores are in pairs, two to each piece, and arranged in four double rows, two on each side of the mesial ridge or convexity of each ambulacrum. The entire surface is ornamented by regularly disposed granules, about twenty to thirty-five of which may be counted on each of the larger interambulacral plates, and as many, in proportion to size, on each of the smaller ones, including the ambulacral pieces.

Height, 4 inches; breadth, about 3·80 inches; breadth of one of the largest interambulacral plates, 0·24 inch; height of do. 0·18 inch; thickening, 0·17 inch.

This species attains about the same size as, and very closely resembles, *Melonites multipora* of Owen and Norwood, but may be at once distinguished by having only four rows of ambulacral pieces, and four double ranges of pores, while *M. multipora* has uniformly double this number, both of pieces, and of ranges of pores.

We take great pleasure in dedicating this noble *echinoid* to Prof. James D. Dana, of New Haven, Connecticut, one of the most profoundly learned of living savans.

Locality and position. Jersey county, near Warsaw, Illinois. Keokuk division of the subcarboniferous series.

Observations upon the Form of the Occiput in the various Races of Men.

BY J. AITKEN MEIGS, M. D.

In 1857, the collection of Human Crania in the Museum of the Academy of Natural Sciences of Philadelphia, contained 1,045 specimens of many different races of men. Since that time, by presentation, deposit and exchange, this total has been increased to 1,125. Eighty additions, therefore, have been made during the past three years. Of this number 27 are North American Indians; 1860.]

2 Araucanians; 25 Peruvians; 4 Chinese; 9 Sandwich Islanders; 2 Marquesans; 1 Feejee; 2 Swedes; 2 Thugs; 1 Hindoo; 1 Tchuktohi; 1 Ice-lander; 1 Cossack and 2 Negroes.

The donors and depositors of these crania are Drs. W. S. W. Ruschenberger, Thomas J. Turner, J. E. Semple, and H. B. Trist, of the United States Navy; Drs. E. H. Abadie and J. Letterman, of the United States Army; Prof. Wm. A. Hammond, Drs. J. Dickson Bruns, J. H. Slack, J. Clifford Parker, J. B. S. Jackson, and Messrs. George Gibbs, John Biddle, N. P. Buckley, Charles C. Abbott, and the writer of this article.

Forty-six of these crania were procured—some of them with considerable difficulty—by my enterprising friend and former school-mate, Passed Assistant Surgeon Thomas J. Turner, chiefly during his cruise in the Pacific. It affords me much pleasure to acknowledge, thus publicly, the value of his indefatigable and intelligent efforts to promote the interests of craniographic science. The thanks of those interested in this important branch of knowledge are also due to the gentlemen whose names are mentioned above.

Chiefly upon this collection, thus increased in the number and ethnical variety of its specimens, are based the following observations, which, in their general scope and tendency, may be regarded as a continuation of the leading inquiry started in my paper on the Jerusalem skull, which was published in the Proceedings of the Academy for September, 1859.

That inquiry, it may be remembered, was to ascertain whether from the form of the entire skull, or of some characteristic part of it, the race as well as the type to which any particular cranium belonged, could be definitely determined. As the basis of this inquiry, a fragmentary head was selected, having a very peculiar occipital conformation, but whose ethnical origin was wholly unknown. This cranium was subjected to a severe critical analysis and comparison with other heads in the collection. In the course of this comparison, whose leading results have already been communicated to the Academy, the following observations were made, and are now brought forward as another contribution to the sum of recorded human knowledge, and an additional step towards the emancipation of Ethnology from the dogmatism and conjectural assertion with which a host of pseudo-scientific writers have so industriously surrounded it, in their ill-advised attempts to solve definitely certain great questions concerning the origin and primitive affiliations of the races of men.

In the very front rank of ethnological inquiry stands Craniography. As the epitome, not of the skeleton merely, but also of the entire physical man, the cranium, by some of the best observers and profoundest thinkers of modern times, has justly been regarded as capable of furnishing valuable information concerning the zoological relations of the different races of men. This conviction animates the "Cephalogenesis" of Spix, the "Decades Craniorum" of Blumenbach, the numerous and important craniological papers of Retzius, the "Tabulæ Craniorum" of Sandifort, the "Crania Americana" and "Crania Ægyptiaca" of Morton, the "Atlas der Cranioscopie" of Carus, the "Crania Britannica" of Davis and Thurnam, the "Organischen Formenlehre" of Lucæ, the "Schädel, Hirn und Seele des Menschen und der Thiere" of Huschke, the "Crania Selecta" of K. E. Von Baer, and most recently of all the "Catalogus Craniorum Diversarum Gentium" of Prof. J. Van der Hoeven, of Leyden, well known as an able observer and a zealous cultivator of the natural history of man.

It must be confessed, however, that owing to the limited number of specimens in the various cranial collections, and the genealogical uncertainty which surrounds many of those which have been figured and described by different observers, craniography can, as yet, boast of but few established principles. The cranial descriptions published by Blumenbach and many of his successors are entirely too brief and vague for the purposes of that exact

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and minute comparison, which alone can lead to any really important results. Before the deeply interesting and complicated questions of ethnology can receive much light from craniography, the latter must furnish extensive comparisons of the heads of different races of men, not in respect to their general form only, but with reference to the exact conformation and minute anatomical peculiarities of each of the several natural regions of the skull—the crown, base, occiput, facial and lateral aspects. Convinced of the truthfulness of this statement, I have attempted, in the following pages, a comparison of the heads in the Morton collection, with reference to their occipital peculiarities only, hoping, at some future time, as leisure permits, to institute, in like manner, a comparison of these heads with regard to their coronal, basal, facial and lateral characters successively.

A peculiar flattening of the upper or parietal portion of the occipital region characterizes the heads of Norwegians (1260),* Swedish peasants (117, 1247, 1249, 1258, 1486 to 1488), Finland, Södermanland, Turannic and Cimbric Swedes (1545 to 1549, 121, 1532, 1550, 1362), Ostrogoths (1255), and Swedish Finns (1542 to 1544). From about the middle of the sagittal suture the parietal bones slope or shelve away posteriorly, so as to form an inclined plane, which modifies or interrupts the regular ovoidal form of the head, and terminates, in most instances, at the lambdoidal suture, or a little below it, on the superior portion of the os occipitis.† The occipital protuberance in all these crania is very well marked; and in some, apparently exaggerated by the peculiarity above mentioned. In the two “ancient Cimbric” skulls (1532, 1550), in a very old Cimbrian head (1362), from the Danish island of Møen, in the Baltic, and in the crania of an Ostrogoth (1255), and a Swedish woman of the 13th century (1249), the knob-like protuberance of the occiput gives to the calvaria a peculiarly elongated and kumbe-kephalic or boat-shaped form. This occipital prominence is also seen in a fragmentary Burgundian head (1533), from a tomb near Lausanne, in Switzerland, but is not so well marked.

From the investigations of Prof. Nilsson, it would appear that the aborigines of Scandinavia, had “short heads, with broad and flattened occiputs,”—features exhibited by other ancient people, such as the Lapps and Samoides, the Iberians or Basques of the Pyrenees, and the mysterious Pelasgi, whose traces are still found in Greece. The short-headed race of Scandinavia appears to have been followed by another race of men, whose skulls were characterized by prominent and narrow occiputs.‡ The hind-head of a large Danish cranium, figured by Nilsson,§ after Eschricht, of Copenhagen, is full and rounded.

In the skulls of “true Finns” (1534 to 1541, 1252, 1259), the occiput is neither prominent nor depressed, but flatly round, and in keeping, therefore, with the general globularity of the head. The Finnic cranial type appears to be preserved in its greatest purity among the primitive inhabitants of Esthonia. Dr. Hueck, in describing the head of an Esthonian, says, that

* The numbers inclosed in brackets are those by which the skulls are designated in my *Catalogue of Human Crania* in the collection of the Academy of Natural Sciences of Philadelphia.

† This conformation also pertains to the Greenland, Scandinavian and Cretin skulls, figured in Tables 3, 4 and 6, of Carus' *Atlas der Cranioscopie*, Heft 1. I find it also more or less strongly pronounced in the crania represented in Tables 3, 4, 8 and 9, (*Schädeln abnormer Form*), and 1, 3, 6, 9, 10 and 11, (*Schädeln bekannter Personen*) of the *Architectur des Menschenschädels*, of Dr. Lucæ.

‡ Report of the British Association for the Advancement of Science, for 1847, p. 31.

§ Skandinaviska Nördens Urinvanare, ett försök i comparativa Ethnographien af S. Nilsson, Phil. Dr. etc., Christianstad, 1838, i. Häftel, plate D, fig. 10.

1860.]

the occiput, in the region of the superior linea semicircularis, is strongly arched, both posteriorly and towards the sides.*

The well-characterized Norwegian and Swedish skulls in the Museum of the Academy have the basal portion of the occipital region quite flat, and parallel with the horizon, when the head rests squarely upon the lower jaw. The lower part of the occiput in the German heads is more prominent than in the Finns, less than in the Swedes, and still less than in the Cimbri; while the upper part is less flat than in the Swedes. The occipital region of the German skull, in point of conformation, occupies a place intermediate between that of the Swedes and Finns.

In the skull of a Dutchman (434), born in Utrecht, the posterior or occipital region is flat and broad, and presents to the eye a somewhat pentagonal outline.

The Anglo-Saxon and Anglo-American crania, though, like the Swedes, longer than the Germanic and Finnic skulls, have nearly the same rounded occiput as these latter. The parietalia of an Anglo-Saxon skull, figured in the first Decade of *Crania Britannica*, incline downwards and backwards towards the occiput, as in the Norwegian cast referred to above. The occipital bone is full and rounded, and has a considerable projection posteriorly.

Most of the skulls in the collection, marked "Celtic Irish," exhibit the same downward and backward inclination of the upper or parietal portion of the occipital region as described above. The occiput of No. 18 has the same boat-like shape as that of the Ostrogoth (1255) and the Cimbri (1532, &c). The occipital region of No. 42 differs from that of the preceding in being a little fuller. The same shelving of the upper occipital region is also present in Nos. 52 and 1186. It is also exhibited, though less markedly, in No. 1356, and still less in No. 985; while in No. 986, the occipital type approximates the Swedish form, being rounder, fuller, less inclined, and having the protuberance not so prominent. In several respects these skulls correspond with those found in the cromlechs or sepulchral mounds of Ireland, and described by Mr. Wilde as possessing the projecting occiput, which characterizes the dolicho-kephalic crania, found in ancient Danish tumuli. It would thus seem that the earliest inhabitants of Ireland, like those of Scandinavia, had short heads and flattened occiputs, while the people who succeeded them were remarkable for long, oval heads and prominent occiputs. Wilson and Bateman, on the contrary, have concluded, from their investigations, that the primitive people of Scotland and England possessed long, kumbe-kephalic or boat-shaped heads, peculiarly characterized by a narrow prolongation of the occiput in the region of the cerebellum. Prof. D. Wilson is inclined to regard this peculiar form of the hind-head as diagnostic of the primitive Caledonians. I find it equally well pronounced, however, in two Egyptian skulls (Nos. 837, 838), from the Pyramid of Five Steps, at Saccara.

In an ancient Briton, of the brachy-kephalic type, figured in *Crania Britannica*, the "occipital bone is somewhat full above the protuberance, which, itself, is strongly marked." In another ancient Briton, belonging to the dolicho-kephalic class, and represented and described in the same work, the occiput is full, prominent and rounded, and presents a strongly-marked transverse ridge.

Three oblong skulls from the catacombs of Paris (661, 662 and 663), have the occiput flattened almost vertically. In No. 663, the upper part of the os occipitis presents a lozenge-shaped prominence, which, though flattened itself, somewhat destroys or interrupts the general perpendicularity of the back part of the head. No. 664, also from the catacombs, is a brachy-kephalic head, with a markedly perpendicular and wall-like flatness of the occiput. This head, I am inclined to think, is that of a Basque or Iberian of the Pyrenees.

There are no Spanish skulls in the Academy's collection. The private

* De Craniis Estonum Commentatio Anthropologica, etc., p. 7.

collection of Prof. Van der Hoeven contains several from Grenada, Catalonia, &c. Of one of these, No. 31, he writes in his catalogue,* "*Occipitis pars superior gibba*," and of another, No. 32, "*os occipitis supra gibbum*." In describing a Lusitanian skull, he says, "*Occiput gibbum; lineæ semicirculares et protuberantia occipitalis vix distincta*."

In the asymmetrical Slavonian skull from Olmutz in Moravia (1251), and in No. 1253, a Slave from Morlack in Dalmatia, the occiput is flatly globular or truncated. If classified according to its form, No. 1251 might be placed between the Turkish and Kalmuck types.

In a Polish skull in Prof. Van der Hoeven's collection, the occipital region is prominent at the apex of the lambdoidal suture. The occiput of another Poland skull is broad and gibbous in the upper portion.

In the Turkish skull figured by Blumenbach (table 2) the external occipital protuberance is but little developed, so that there seems to be no occiput. Two Turkish skulls obtained from a burial ground at Scutari, and described by Dr. Williamson,† have a rounded occiput.

In a Cossack skull (133) from Balaklava, the occiput is broad and very flat.

In the Hungarian cranium, according to Edwards,‡ the back of the head appears flat, forming almost a straight line with the nape of the neck.

A cast of the skull of a young Greek (1354), exhibits a moderately full and rounded occiput. In the Greek skulls, in the Chatham collection, the "occiput is well rounded, and does not, in general, project; the space for the downward projection of the brain in the occipital region is well developed."

The cranium of a Roman prætorian soldier, figured by Blumenbach,§ has the external occipital protuberance very broad and prominent. In the skull of a Roman soldier,|| taken from an ancient cemetery at York, the occiput is broad and rounded, and the protuberance rather prominent. So also in the Roman cranium described by Dr. Thurnam,¶ the occipital bone is full and prominent, especially in its upper half.

In an Etruscan skull in the Galerie Anthropologique at Paris, the occiput is full and rounded.**

The general form of the occipital region of the so-called Phœnician skull (1352) is like that of the Norwegian. In the latter, however, the external occipital protuberance, and the superior curved line are strongly pronounced; in the former the skull is quite smooth at this place.

All the Circassian skulls exhibit great fulness of the occipital protuberance. The upper part of the hind-head is flat. The occiput as a whole is rounded in the Armenian skull, No. 789, and in this respect is like the Persian skull, No. 731. Nos. 790, 791, 792 (Armenian) are longer and more angular heads, and owing to the prominence of the occipital protuberance, are more like the Circassian skulls. In Nos. 792 and 794, also Armenian, the occiput is flatly round. The rather short and angular Parsee heads, exhibit a rounded occiput—very well shown in No. 731, but less marked in No. 743, owing to the general prominence of the occipital bone. The form of the occipital region in the Affghan head, is like that of the Armenian and Circassian.

The Baluchi and Affghan heads in the Chatham collection have the "occiput

* *Catalogus Craniorum Diversarum Gentium quæ collegit, J. Van der Hoeven. Lugduni Batavorum, 1860.* This valuable catalogue contains a brief account of 171 human crania and 39 casts, with the principal measurements of all the skulls.

† *Observations on the Human Crania contained in the Museum of the Army Medical Department, Fort Pitt, Chatham.* By George Williamson, M. D., Dublin, 1857.

‡ *Des Caractères Physiologiques des Races Humaines.* Par W. F. Edwards, 1829.

§ *Decades craniorum.* Tab. 32.

|| Described by Retzius in Müller's *Archiv. für Anat., Phys., etc.* Jahr. 1849, p. 576.

¶ *Crania Britannica, Decade I.*

** See *Cranial Characteristics of the Races of Men, in Indigenous Races of the Earth,* p. 313, for a drawing of this skull.

well rounded, and the space for the downward development of the brain considerable." The occiput of a Candahar skull is "broad, flat and perpendicular, giving the skull something of the appearance of the flat-headed American Indians, although in a much less degree."

The Affghan head, as a whole, resembles, in several respects, the Hindoo type.

The ancient Assyrian skull is full and rounded in the occipital region.

The Egyptian skulls differ among themselves as regards the form of the occiput. Of the series termed "Græco-Egyptians" by Dr. Morton, Nos. 799, 801, 804, 812, 815, 821, 824, 856, 837, 838, 840 and 875, possess, in general, the same occipital form as is seen in the Swedish crania referred to above. Nos. 798, 808, 814, 817, 825, 850, 859, 868, 873, 884 and 893 have the occiput less ovoidal in shape and more rounded, owing to the external occipital protuberance being less prominent. These latter skulls are, in general, broader than the former, and exhibit a somewhat different configuration of the crown. The same difference is observable in the other groups of skulls representing the Egyptian race in the Academy's collection. Thus of the Ancient Theban Egyptians, Nos. 48, 60, 844, 846, 855, 862, 876, 1044, 1293 and 1295 exhibit a more or less rounded occiput, while in Nos. 847, 848, 849, 851, 853, 854, 860, 866, 867, 871, 880, 881, 882, 883, 887, 889, 894 and 1290, the occiput is either shelving, as in the Swedish skull, or elongated, owing to the great protuberance of the occipital boss, as in the kumbe-kephalic crania above alluded to. According to Dr. Morton, No. 1044 may serve as a *type* of the genuine Egyptian conformation. He describes it as a long, oval cranium with a receding forehead, gently aquiline nose, retracted chin, and a marked distance between the nose and mouth—features all characteristic of the monumental Egyptian. He makes no allusion, however, to the configuration of the occiput, which, as will be seen by referring to the wood cut on p. 17 of "*Crania Egyptiaca*," or p. 38 of my Catalogue, is quite peculiar. Some idea of the variety of occipital forms among these Egyptian skulls, may be obtained by comparing together the wood cuts in my Catalogue representing Nos. 812, 878, 1044, 888 and 877 of the collection. Dr. Morton's descriptions of the Egyptian skulls are, in general, very brief. He seldom alludes to the shape of the occiput. He notices the "tumid" occiput of No. 871, and the "full" occiput of No. 867. The occipital region of Nos. 861 and 886 is intermediate in shape between the elongate and rounded forms. Of the ancient Egyptians from the Necropolis of Memphis, Nos. 1223, 1235, 1519, 1520, 1521 and 1522 possess a rounded occiput. In all the rest the posterior part of the head is elongated and flattened superiorly. This elongation is particularly well marked in Nos. 809, 810, 811, 813, 1201, 1291, and also in No. 819 from Arabat el-Matfoon, the ancient Abydos. In all these skulls the external occipital protuberance is exceedingly prominent. This statement applies also to three embalmed Egyptian heads found by Mr. Wm. A. Gliddon in a rock-tomb located about four miles west of the city of Alexandria, and belonging, probably, to the Ptolemaic era. Among the Memphite Egyptian skulls is one (No. 806) which is altogether peculiar and unlike the other heads of this series. It has a broad, low and flat occiput, while the coronal region is decidedly Gothic in its outline. All the crania obtained from the tombs opened by Prof. Lepsius at the base of the great Pyramid of Gizeh, are long, oval heads, with protuberant occiputs, flattened superiorly. Three Kens or ancient Nubians from the pits at Debôd, (827, 828, 829) exhibit the protuberant, shelving form of occiput. The hind head in No. 828 is exceedingly elongated. Dr. Morton speaks of the very full occiput of this skull. He makes no allusion to the occipital form in his descriptions of the others. The occiput of No. 826 is rounded. Two crania (830, 831) of ancient Egyptians, from the pits at Koum Ombos, have a rounded occiput. A third, No. 832, has the occiput superiorly flattened. The Academy's collection contains four skulls of ancient Egyptians, obtained by the late Mr. G. R. Gliddon from the crocodile mummy-pits called Margaret-es-Sa-

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moun, behind the village of Maabdeh, and opposite to Manfaloot. Three of these, Nos. 834, 836 and 1292, have the shelving occiput; in the fourth, No. 833, the occiput is rounded. Among the Egyptian skulls grouped in the Catalogue under the head of *Miscellaneous*, there is one (No. 822) which differs considerably in its general form and characters from the skulls with which it is associated. It was obtained by the late Mr. Gliddon from a tumulus at the Island of Beggeh, the ancient Senem, a sacred spot close to Philæ in Nubia. Mr. Gliddon seems to have regarded this skull as that of "a pilgrim to the Temple." The configuration of the crown is triangular, while the occiput is almost vertically flattened. Of the four other heads in this group, Nos. 802 and 1240 possess the rounded form of occiput, while in Nos. 803 and 1317 the hind-head is superiorly flattened.

The dolicho-kephalic Hebrew skulls in the collection, exhibit an occiput more or less regularly rounded, as is very well seen in Nos. 818, 842, 845, 865 and 870. In the oblong and somewhat angular head, No. 807, the basal portion of the occiput is perceptibly flattened, and the occipital protuberance somewhat more prominent than in the other skulls of this group.

In the Arab skulls the occiput is broad and flattened. In No. 781 the occipital region is flattened superiorly, as in the Norwegian and Swedish crania, and the occipital protuberance quite prominent. In No. 784 the head widens out behind the mastoid processes, giving the occipital region a full and rounded appearance. In No. 780 the occiput is flattened.

The Fellah skulls have very prominent occiputs, the occipital protuberance being more or less strongly marked. The Coptic skull exhibits great breadth and fulness of the whole posterior region.

The occiput of the east of an Abyssinian skull in the collection (1361) is quite prominent; the hind-head shelves downwards and backwards somewhat like that of the Swede.

The occipital region of the Guanché cranium (23) is full and prominent.

The Hindoo skulls in the collection, also vary in the form of the occipital region. Some of the Ayra, Brahminic or high caste heads of this group, such as Nos. 1329, 1331 and 1335 exhibit the Swedish form of occiput; others (Nos. 1330, 1384) the rounded shape. In four Thugs, the occipital configuration is intermediate between these two forms. In No. 1332 the occiput is almost vertically flattened. In 11 Bengalee crania, (Nos. 6, 25, 31, 81, 411, 413, 432, 443, 444, 948 and 1312) the occiput is flatly round. In 21 others (Nos. 4, 5, 8, 19, 20, 28, 32, 49, 51, 111, 410, 442, 547, 553, 554, 665, 1309, 1310, 1311, 1344 and 1554) posterior part of the head is superiorly flattened and inclined. In No. 20 the whole os occipitis stands out very prominently, and is separated from the ossa parietalia by numerous wormian bones. This feature is also seen, to some extent, in Nos. 1309 and 1310. Such a form of the occiput is very well exhibited in plate 20, fig. 1, of the Atlas to Vimont's *Traité de Phrenologie Humaine et Comparée*. In No. 29, a peculiar and asymmetrical skull, the occipital bone appears as if pressed from behind and beneath forwards and upwards. The hind-head of No. 1047 is almost vertically flattened.

In certain crania from the Indian Peninsula, Dr. Williamson says that the posterior part of the skull is large, and the occiput prominent; the space for the downward development of the brain of moderate extent. Two Hindoos and a Thug have the occiput prominent. In five crania from Ceylon, the occiput is well rounded.

There are thirteen Chinese skulls in the Academy's collection. Of these, Nos. 94, 550, 669, 670, 1526, and 1527 exhibit the elongate, shelving form of occiput, very well represented in the wood-cut on p. 47 of my *Catalogue of Human Crania*. In Nos. 3, 56, 426, 427, and 1028, the occiput is rounded, and in No. 1336 vertically flattened. The Chinese crania in the Chatham Museum have the occiput rounded and not prominent. According to Blanchard, in the Chinese skulls figured in Dumoutier's Atlas, "la région occipi-1860.]

tale s'étend peu en arriere." Blanchard informs us that this character is exhibited in many of the specimens of this race, contained in the anthropological collection of the Muséum d'Histoire Naturelle de Paris. In all these specimens he found the posterior part of the head a little less elongated than in the inhabitants of the Phillipine Islands.*

In a Japanese skull (668) the hind-head is rounded; in two Loo-choo crania (672, 673) it is shelving.

In two Burmese crania, (661, 667) the occiput is round and moderately full. The occipital region of a Siamese skull, from Bangkok (123) is broad and flat, and slightly resembles that of the Malay head.

Some of the Malay crania, (41, 1186, 1316, and 1525,) have elongate or shelving occiputs; in others, (46, 47, 201, 433, 543, 1338, 1339, 1341, 1523,) the occipital region is more or less flatly round; and in others still, (424, 425, 428, 429, 430, 459, 495, 544, 546, and 1337,) it is more or less globular. In Nos. 545 and 1340, the occiput is compressed behind, and somewhat beneath, so as to form a sort of inclined plane, sloping downwards and forwards, to the foramen magnum.

Nine Burmese and Malay crania in the Chatham collection have the occiput broad and well rounded; and the space for the downward development of the cerebellum in the occipital region extensive. In one Burmese skull, the posterior part of the head is large, and the occiput straight. In a Japanese skull the occiput is broad, flat, and almost perpendicular. This is true also, of some of the Malay skulls, and of two Burmese described by Dr. Williamson, in the appendix to his catalogue.

Finlayson, in describing the tribes of the Trans-Gangetic, or Indo-Chinese Peninsula, says that "the occipital foramen is often placed so far back that from the crown to the nape of the neck is nearly a straight line."† According to Dr. Ruschenberger, the occipital portion of the Siamese skull is nearly vertical, and compared with the anterior and sincipital division, very small.‡ In the inhabitants of Cochinchina or Annam, according to Morton, the occipital portion of the head is more elongated than in the Siamese.

Only one (1551) of the Lapland skulls in the Academy's collection has the shelving occiput; all the others, (1250, 1257, and 1552,) possess a broad and flatly rounded occipital region.

All the Eskimo crania in the collection have narrow, elongate, or ovoidal occiputs. In an Eskimo skull at Chatham, the "occiput is narrow and prominent."

In the Tchuktchi crania brought from Behring's Straits by my friend, E. M. Kern, Esq., the occiput is prominent and shelving. The skull of an Aleutian, from Unalashka, contained in the Rijk's Museum of Natural History, at Leyden, and figured and described by Prof. Van der Hoeven, has a prominent occiput.§

The occipital region of a Kamskatkan cranial cast (725) is full and protuberant. In the skull of a Northern Reindeer Tungus, figured by Blumenbach, in Table xvi. of his *Decades Craniorum*, "the occiput is remarkably prominent, so that the distance between the external occipital protuberance and the superior incisors is equal to nine inches." The Kalmuck (1553) and Burat skulls (1355) have globular occiputs.

The occipital region of the skull of an Iclander (125) is full, protuberant, and shelving.

* Voyage au Pole Sud et dans l'Océanie, &c. Anthropologie. Par Émile Blanchard. Paris, 1854.

† Embassy to Siam and Hue, p. 230.

‡ A voyage Round the World; including an Embassy to Muscat and Siam. By W. S. W. Ruschenberger, M. D. Philada., 1838, p. 209.

§ Beschrijving van Drie Merkwaardige Menschelijke Schedels uit het Rijk's Museum van Natuurlijke Histore te Leiden. Door J. Van der Hoeven.

Four of the Kanaka skulls in the collection, (564, 695, 1300, and 1308,) have elongate or shelving occiputs. In three others, (566, 572,) the occiput is rounded. In two skulls from Oahu, (1023, 1024,) the occipital region is prominent; in another (1022) it is more rounded. Three Tahaitian crania (1017, 1019, 1020,) exhibit protuberant and shelving occiputs. In two other Tahaitian heads (1016, 1021) the occiput is more rounded, and in still another (1018) it is broad and flat. The crania of Sandwich Islanders, in the Chatham collection, possess rounded occiputs. In an Otahaitian skull the occiput is prominent.

There are three Marquesan skulls in the Academy's collection. In one of these, from Nukahivah, the occiput is narrow and shelving, and the occipital boss quite protuberant. In another, also, from Nukahivah, and a third from Christina, the occipital region is fuller and less prominent.

All the New Zealand crania in the Academy's collection exhibit the elongate and narrow form of occiput. In five New Zealand skulls in the Chatham Museum, "the occiput is not prominent, but well rounded off."

In a Feejee specimen from Bau, (1029) the occipital region is narrow and protuberant.*

Three Arickaree skulls, of the Upper Missouri, exhibit the same shelving occiput and prominent occipital protuberance, seen in the Swedish, Cimbrian, and Ostrogoth crania. They are long, oval skulls, and resemble, in their general configuration, the Swedish crania, as may be seen by comparing together No. 649 (Arickaree), and No. 1247 (Swede). One of the Arickaree skulls (No. 748), presents a somewhat modified occipital form. It is like that represented in plate 35 of *Crania Americana*, or fig. 2 of plate 96 of Vimont's Atlas. The superiorly flattened form of the occiput is also seen in the Assinaboin skulls, though less strongly marked. These crania are broader and less oval than the preceding. The same occipital form is also very well marked in Nos. 632 and 635 of the Cherokee group. These two crania are long ovals. In the other specimens of this group, the occipital protuberance is less prominent, and the whole hind-head more evenly rounded in the line of prolongation of the sagittal suture. These Cherokee skulls differ from each other in several particulars. In two Chetimache skulls, from Louisiana, the occipital region is flattened nearly perpendicularly from the superior spinous ridge upwards. In the Chippeway or Ojibway skull, No. 684, the hind-head is shelving; in No. 683 it presents a different form, as seen in plate 28 of *Crania Americana*. Two of the Kootenay crania (Nos. 744, 745), have the occiput protuberant and elongated. In No. 1227 the hind-head is flat. Two of the Creek skulls (Nos. 441, 579), are short heads with broad, globular occiputs. No. 751, a long, oval skull, has the superiorly flattened hind-head and prominent occipital protuberance well marked. In its general form, this head strongly calls to mind the Cimbric type or configuration. In No. 1454 the occiput is rounded. Dr. Morton, writing in 1839, says that "the present Creek nation is said to embrace the remains of no less than fifteen different tribes, which they have conquered at various times." This fact may explain the discrepancy in forms exhibited by the different specimens of this group. The Dakota skull (No. 605) has a globular occiput. In No. 112, the occipital region is very much elongated and shelving, as in the Creek skull (No. 751). The occiput of No. 204, resembles that of the Cayuga skull, figured in plate 35 of *Crania Americana*. The Huron cranium (No. 15) is beautifully lithographed in *Crania Americana*, pl. 37. Reference to it will show that the occiput is so flattened as to slant or incline from above downwards and backwards, and to

* One half of the crania contained in the Polynesian group of the Morton collection were procured by Dr. Thos. J. Turner, who is preparing a monograph on the cranial and other physical characteristics of this interesting race, several varieties of which he was able to study practically during his cruise in the Pacific.

occupy a position between the shelving occiput of the Swede and the vertically flattened form. Nos. 1217 and 1218 exhibit the same form. No. 607 approximates the shelving, or superiorly flattened shape. The exact form of the hind-head cannot be determined in the Illinois crania in the Academy's collection, for the whole of the os occipitis is wanting in No. 1010, and the greater part in No. 1051. In the former, the occiput appears to have been shelving; in the latter, flatly round or globular. In two Iroquois skulls (Nos. 16 and 119), the occiput is elongated and shelving. In a third (No. 989), it is almost globular. Of the Lenape, or Delaware Indian skulls, Nos. 40, 115, 118, and 1265, possess an elongated occiput, such as is seen in plate 32 of *Crania Americana*. In No. 418 the posterior region is rounded, and far less prominent. In Nos. 1263, 1562, and 1563, the hind-head is broad and squarely flattened. In No. 1264 the occipital protuberance is prominent and knob-like. No. 998 is flatly round in the occipital region. In all the Mandan and Minetari skulls, the form of the occipital region is very similar to that of the Arickarees and Assinaboins. The form of the occiput varies among the different specimens of the Menominee group. Nos. 35, 44, 78, 454, and 563, exhibit the form seen in the Huron skull, figured in *Crania Americana*, plate 37. The other two (Nos. 1220 and 1222), are more elongated behind. No. 1058 of the Miami group, has an occiput like the Huron cranium just alluded to. In 1233 the hind-head is perpendicularly flattened. All the rest of this series exhibit the elongated form. In the three Mohawk crania, the occiput is superiorly flattened, and the occipital protuberance prominent. Two Moqui skulls (138, 139), are brachycephalic, with very flat occiputs. The Narragansett skulls in the collection differ from each other in the form of the occipital region. In No. 950 the hind-head is elongated. In No. 951 it is shelving, all that part of the occipital bone above the superior spinous ridge being tumid. The posterior part of the head, in Nos. 952 and 954, shelves or inclines from above downwards and backwards. In the latter skull the occipital base is very protuberant. In No. 953 the occiput is full and rounded, instead of being elongated, as in the others. This is true, also, of Nos. 956 and 693. In the latter, the os occipitis is somewhat pressed forwards under the parietalia. No. 1040 is a very peculiar, oblong head; the shelving and elongated occiput projects far behind the external auditory meati, and the basis-occipitis is quite flat. Nos. 955 and 957 have pointed or acuminate occiputs, which appear to be posthumously distorted. In No. 955 the left side of the occipital bone is flattened; in No. 957, the right. In the former the left side, and in the latter the right, appears to have rested upon the ground for a very long time, and to have been flattened by the weight of the superincumbent bones of the head. This flatness gives an acuminate appearance to the occiput, the point being to one or other side of the median line. Since the publication of *Crania Americana*, craniographers have been familiar with the vertical flatness of the occiput in crania of the Natchez tribe. This peculiar flatness is well shown in No. 1106. The shelving occipital form is shown in all the Natick skulls. Of the Osage crania, No. 54 is a short, angularly round head, with an occiput almost vertically flattened. In No. 660, a larger head, the tumid occiput gives a shelving form to the hind-head, seen in profile. In the Ottoes the occiput is broad and flatly round, and approximates strongly, the globular form exhibited in the Lapps and Kalmucks. The same form is exhibited in the round-headed Ottawa, No. 1007. In the other two Ottawa skulls, the hind-head is shelving. In the round-headed Ottigamies, the occiput is globular. In No. 415 of this group, this globular shape is destroyed by the tumid occiput. The two Pawnee skulls contrast strongly with each other in the shape of the occiput, which in No. 540 is flatly round, and in No. 1043 is excessively elongated and shelving. In two Penobscot skulls the occiput is rounded. Of the Potawatomie crania, No. 657, as shown in plate 34 of *Crania Americana*, has an angularly round

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occiput. In No. 736, a short, triangular skull; the occiput is flat. In the broadly oval cranium (No. 737), the hind-head is rounded. In No. 1352 the hind-head approximates the shelving type. The two Sauk skulls are unlike each other in the shape of the occiput. No. 561 has a broad, though protuberant hind-head. In No. 1246 the occipital region is rounded. The Seminole Indians are represented in the Academy's collection by sixteen skulls. No. 456 (figured in *Crania Americana*, pl. 24), is a round head, with a full and somewhat angularly rounded occiput. In No. 604 the knob-like protuberance of the occipital bone destroys the rounded form of the hind-head, and gives the latter a different shape, as will be seen by comparing the first cut on page 166 of *Crania Americana*, with plate 24 of that work. In No. 698 the hind-head is elongated and shelving. In No. 707 it approximates in its lower part the globular form, and is in striking contrast with No. 456, as may be seen by comparing together plates 23 and 24 of *Crania Americana*. In No. 708 it is more elongated and less broad, and in No. 754 rather flatly rounded. No. 726 is a short head, with a full, broad, but somewhat shelving occiput. No. 727 possesses a narrow and prominent occiput, which is wider between the parietal bosses than at the base. In No. 728 the occiput is fuller and more rounded. In No. 729 the hind head is rather narrow below, and protuberant. In No. 730 the occiput is broader at the base than above, and quite pointed. In Nos. 732, 733, 753,* and 1286, the occiput is protuberant and shelving above. A Shawnee skull, No. 606, has a very narrow, protuberant, and symmetrical occiput; the left, basal part of the occipital bone being flattened, perhaps posthumously. In No. 691 the occiput is flattened vertically on the right side. In No. 1210, a narrow, and highly arched skull, the hind head is narrow, and the upper part of the occipital bone prominent. The Shoshone skulls in the collection are not alike in the form of the occiput. No. 1446 exhibits a broad and somewhat flatly rounded hind-head, appearing as if pressed under the parietal bosses; the upper and posterior part of the head, just between the parietal protuberances, being broad and very elevated. In No. 1447 the occiput is protuberant and shelving. In No. 1448 the occiput is broad at the base, and flattened, though not vertically. No. 1449 possesses a rounded and not very prominent occiput. Two Upsarooka skulls, (Nos. 1228 and 1229), have the hind-head shelving, and the occipital base very prominent. In the Winnebago cranium (No. 559), the occiput is broad and globular. In No. 560 it is less broad and more projecting. In the Yamassee skulls (Nos. 1214 and 1215), the occiput is narrow and rounded. In No. 1216 it is broad and rounded, almost to globularity. There are four skulls of California Indians in the collection.† No. 1514 exhibits what may be called a pyramidal occiput. The occipital bone above the superior spinous ridge is very prominent, and constitutes a common centre, towards which the parietals slant from above downwards and backwards, and also at the sides, and the basal portion of the occipital bone upwards and backwards, somewhat after the fashion seen in some of the elongated Peruvian heads. No. 1027, a female cranium from Maré Island, California, is a long, narrow head, with a narrow and oval occiput. No. 943, also from Maré Island, exhibits a shelving occiput.

Of the crania marked "miscellaneous" in the Catalogue, No. 416, from a mound on the Upper Mississippi, possesses a narrow and prominent occiput. This skull is represented in plate 52 of *Crania Americana* in such a position that, at first sight, the occiput appears full and rounded. But if the observer will place his hand over the lower jaw, so as to hide it, and then hold the lithograph in such a manner that the base of the skull shall be parallel with

* The last skull of the Seminole group should be numbered in the Catalogue, 753, instead of 1556.

† Two of these are enumerated in the published Catalogue. The other two have been added to the collection by my friend, Dr. Thos. J. Turner, of the United States Navy, since the Catalogue was printed.

the plane of the horizon, he will then see that the head is in reality a long one, and that the occipital region is prominent and not round. No. 1237, from Illinois, is a broad, asymmetrical head, flattened behind slantingly, and rather to the left. Nos. 1315, 1510, and 1511 have broad, prominent, and somewhat shelving occiputs. No. 420, from the Cave at Steubenville, Ohio, has a low, broad occiput, flattened on the right side. In No. 436, also from the Cave-cemetery at Steubenville, the broad occiput is almost vertically flattened. In Nos. 437 and 438, also from Steubenville, the occiput is low, broad, and vertically flattened. The former is asymmetrical. The occiput is slantingly flattened in No. 439. No. 210 is wanting in symmetry. The occiput is flattened on the left side, perhaps posthumously. It appears to have been originally moderately full and rounded. In No. 658 the broad occiput is asymmetrical flattened to the right of the median line. No. 723, also non-symmetrical, has a low, broad, and vertically flattened occiput. In No. 53, from a mound at Circleville, the occipital protuberance is prominent, and the hind-head shelving. No. 1287, from a mound at Chillicothe, has a broad occiput, slightly truncated or flattened, directly behind. No. 1288, from the same place, occiput shelving and very protuberant. No. 992, from a mound in Tennessee, broad, asymmetrical, and perpendicularly flattened or truncated. No. 1270, from Detroit, occiput shelving and protuberant. No. 1271, from Ohio, occiput broad, and flattened directly behind. No. 1272, found with the preceding, occiput moderately prominent. No. 1455, from a mound in Florida; a very mis-shapen skull, with a low, broad, and asymmetrical flattened occiput. No. 417, Cayuga, of New York: occiput elongated and prominent. No. 1041, a Cheyenne of Missouri; occiput shelving and protuberant. No. 211, from Missouri; a broad and flat head, with globular occiput. No. 987, Chemesyan, from the N. W. coast of America; occiput full and rounded. No. 22, young Choctaw female, of Georgia; occiput protuberant and shelving. No. 39, Euchee Indian, of Florida; occiput full and rounded. No. 212, cast of a Kenahawha skull; occiput vertically flattened. No. 27, Massasauga Indian, of Peterboro', Upper Canada, and No. 455, Mingo Indian, from Ohio; occiput elongated and shelving. No. 1219 Nanticoke, (?) from the Wyoming Valley; occiput full and globular. No. 567, Naumkeag, of Massachusetts; occiput narrow and prominent. No. 33, Oneida warrior; occiput flattened; occipital base prominent. No. 1036, Pocasset Indian; occiput flatly rounded. No. 26, Quinnipiack (Mohegan) Indian; occiput globular. No. 1516, Seneca Indian, from New York; occiput broad and truncated, or flattened directly behind. No. 1557, from the banks of the Susquehanna; form of the occiput very much like that of the California head (No. 1514). In Nos. 216 and 219, the occiput is shelving and protuberant. The same form is seen in the Maya skull (No. 990). The Araucanian skull (No. 651) has a full and rounded occiput. In No. 652 the occiput is arched. In No. 654 the occipital region is square and truncated, or vertically flattened, as is well shown in plate 68 of *Crania Americana*. In Nos. 655 and 656 the occiput is moderately full and rounded. In No. 995 the hind-head is fuller than in the preceding, and the occipital protuberance more prominent. In No. 997 the occipital boss is very prominent. In No. 221 the hind-head is shelving, and the occipital protuberance sharply pointed. In No. 222 the occiput is shelving and protuberant; in No. 120 it is broad and flatly round. The flattened form of the occiput of No. 1242 is well shown in the wood-cut on p. 75 of the Catalogue. The three Charib skulls in the collection have prominent and elongated occiputs. In the cast of a Patagonian skull, the hind-head projects far behind the meati. The whole of the occipital region is full and tumid. In many of the crania which we have passed in review, the elongation of the occiput backwards is chiefly due to the great prominence of the occipital boss. In the Patagonian head, this feature is not present. The hind head of the Puelche girl is rather flat. The head of a Puelche, from the Rio Negro, figured by d'Orbigny, has a truncated

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occiput.* In all the Brazilian crania, the occipital region is more or less elongated and superiorly flattened, as in the Swedes.

There are nine aboriginal American skulls in the collection at Fort Pitt, Chatham. These are described by Dr. Williamson† in his catalogue. No. 67, from Lake Huron, has a rounded occiput. No. 68, skull of a North American Indian, has the occiput projecting. In No. 69 "the vertex and occiput are well arched." In No. 70 the occiput is rounded. In No. 71 "the vertex and occiput are well rounded." In No. 473, from Canada, the occiput is large and well rounded, and the space for the downward development of the brain in the occipital region is very great. No. 474, also from Canada, is a round skull. No special statement is made concerning the form of the occiput, but from the general description of the head, I consider it to be oval. In No. 475. a Flathead, "the occiput descends from the vertex abruptly, and almost perpendicularly to the foramen magnum." In No. 476, a Charib, from St. Vincent, "the vertex gradually slopes backwards and downwards to the occiput, which projects, and is narrow from above downwards; the occiput is very flat, and nearly the whole of the occipital bone rests upon a plane surface."

The late Dr. Morton, as is well known, regarded flatness of the occiput as a characteristic feature of the aboriginal American skull. In *Crania Americana* (page 65), he expressly says that "flatness of the occipital portion of the cranium will probably be found to characterize the greater or less number of individuals in every existing tribe, from Terra del Fuego to the Canadas. If these skulls be viewed behind, we observe the occipital outline to be moderately curved outwards, wide at the occipital protuberances, and full from those points to the opening of the ear. From the parietal protuberances there is a slightly curved slope to the vertex, producing a conical, or rather a wedge-shaped outline." He says, furthermore, that even in the elongated heads of the Lenapes, the Iroquois, Cherokees, Mandans, Rickarees, and Assinaboins, "the characteristic truncation of the occiput is more or less obvious." In another publication,‡ when alluding to the physical characteristics of the Indian tribes, he again speaks of "the flattened or vertical occiput" as a characteristic common to them all. In the 3d edition of his *Catalogue of Skulls of Man and the Inferior Animals*, Dr. M. briefly describes a very remarkable head, found by Dr. Davis and Mr. Squier, in a mound in the Scioto Valley, Ohio, and described and figured by them in their "Ancient Monuments of the Mississippi Valley," plates 47 and 48. Dr. M. regarded this head as the "perfect type of the Indian conformation, to which the skulls of all the tribes, from Cape Horn to Canada, more or less approximate. It possesses the national characteristics in perfection, as seen in the elevated vertex, flattened occiput, &c. Similar forms," he continues, "are common in the Peruvian tombs, and have the occiput as in this instance, so flattened and vertical as to give the idea of artificial compression; yet this is only an exaggeration of the natural form, caused by the pressure of the cradle-board, in common use among the American nations."

In his last contribution to craniography,§ Dr. Morton describes the typical Indian skull to be of a decidedly rounded form, with the occipital portion flattened in the upward direction.

Dr. Morton's opinion concerning the typical form of the occiput in the various tribes of American Indians, though very generally acquiesced in by craniographers, has not been accepted by all without qualification.

"L'inspection des crânes mexicains," writes Dr. Gosse, of Geneva, représentés dans les *Crania Americana* me semble prouver que chez ces derniers,

* L'Homme Americain. Atlas, Plate i. fig. 1.

† Op. cit. pp. 64-67, 83, 85.

‡ Inquiry into the Distinctive Characteristics of the Aboriginal Race of America, p. 5.

§ The Physical Type of the American Indians.

la dépression de l'occiput était loin d'être aussi générale et aussi marquée que parmi les Incas et que chez les crânes examinés par Meyen ; car dans plusieurs d'entre eux, la tête est plutôt normalement développée en arrière. Ce qui m'étonne," he continues, "c'est qu' indépendamment de la transmission héréditaire, Morton n'ait pas fait jouer un rôle plus général à l'action prolongée de ce genre de berceau, le compagnon des peuples nomades sur l'aplatissement du derrière de la tête, qu'il considère comme un caractère normal du type américain."*

Dr. J. B. Davis also writes that though "this position of Morton's is no doubt founded in truth, yet it must be allowed to be liable to numerous exceptions." His doubts appear to have been awakened by the fact which he mentions, that the crania of Americans, figured by Sandifort and Milne-Edwards, (one of them given as a typical skull), are both distinguished by a considerable occipital projection.†

Prof. Daniel Wilson, of Canada, in a recent interesting paper on the Cranial Type of the American Aborigines,‡ tells us that he has carefully examined twenty-nine Indian skulls, three only of which he regards as brachycephalic. "One of these three, a very remarkable and massive skull, was turned up at Barrie, on Lake Simcoe, with, it is said, upwards of two hundred others. It differs from all the other Indian crania, in exhibiting the vertical occiput so very strikingly, that when laid resting on it, it stands more firmly than in any other position." He thinks there can be little doubt that the flattened occiput of this skull is the result of artificial compression of a much more decided nature than that of the cradle-board of the papoose.

Further on, he says, "I am struck, in the majority of the examples examined, with the total absence of any approximation to the flattened occiput." Fifteen of the crania referred to exhibit a more or less decided posterior projection of the occiput, twelve of these being markedly so, and seven of them presenting such a prolongation of it, as constituted one of the most striking features in one class of ancient Scottish crania, which chiefly led to the suggestion of the term kumbecephale."§ * * * "I think it extremely probable that further investigation will tend to the conclusion that the vertical or flattened occiput, instead of being a typical characteristic, pertains entirely to the class of artificial modifications of the natural cranium familiar to the American ethnologist, alike in the disclosures of ancient graves, and in the customs of widely separated living tribes."

From the details which I have presented above, it will be seen that the opinions upon this subject, entertained by Dr. Morton, cannot be substantiated by the aboriginal American crania in the Academy's collection. The vertically flattened occiput is by no means a distinctive character of these crania ; on the contrary, it is only an occasional feature among them, and is exhibited also by the skulls of other, and distant races of men. In fact, the occipital region of our American Indian skulls exhibits quite a variety of forms. In some, as we have already seen, the flatness is located superiorly, affecting equally the posterior superior part of the ossa-parietalia, and the upper part of the os occipitis ; in others, and they are comparatively few, the flattening is directly behind, and is vertical ; in a third variety the flatness is confined wholly to the basal portion of the occipital bone. In some of the skulls the occiput is evenly rounded, in the direction of the longitudinal periphery, the transverse diameter, behind the bony meati, being comparatively small ; in others it is full and globular. If the reader will place the *Crania Americana* before him, and compare together the outline representations of the posterior part of the skull in the different tribes of Indians, he will be struck with the

* Essai sur les Déformations Artificielles du Crâne. Paris, 1855, pp. 72, 74.

† *Crania Britannica*, Decade 3, p.

‡ Canadian Journal of Industry, Science, and Art. November, 1857, pp. 425, 427.

§ Prehistoric Annals of Scotland, p. 109.

difference of form which they exhibit. In some it is higher than broad; in others it is broader than high; in others again, the greatest breadth is between the parietal bosses; in a fourth variety the greatest breadth coincides with the base. In some, the contour of the hind head is almost square; in some almost circular; in some oblong; in others triangular, and in others still, pentagonal or very irregular. Now, none of these forms are diagnostic of the Indian skull. Indeed, they all appertain to the races of the Eastern continent, as well as to those of the Western.

It is very well known to craniographers that Dr. Morton, as early as 1846, pointed out the existence of at least four different forms of the Peruvian skull, all of which he regarded as artificial deformations, although in his *Crania Americana*, published long before, he contended that these forms were natural and congenital. Five years later, Dr. Rivero and Tschudi, without appearing to be aware of the views of Dr. Morton, arrived at the same conclusion—that these peculiar forms were congenital, and that there were four varieties of them. Now, in all these varieties the occiput, as might be expected, varies in form. One variety is very well shown in plate 2 of *Crania Americana* (No. 496 of the Catalogue), and also in the wood-cut representing No. 1277 of the Catalogue. This form of occiput is also seen in Nos. 1275, 1279, 1280, 1281, 1283, 1284, 1363, 1364, 1366, and many others. A very different form of the whole head, and of the occiput, which is flatly rounded, is seen in plate 7 of *Crania Americana*, representing a Peruvian, from Santa. No. 1276 exhibits a similar occiput. In his interesting work entitled *Three Years in the Pacific*, Dr. Ruschenberger alludes to the peculiarities of form shown in Peruvian skulls. He says that in many of the crania obtained by him at Santa, the occiput “is almost vertical, and rises quite abruptly from the great hole at the base” (p. 374). In plate 4 of *Crania Americana*, it will be seen that the occiput is much fuller and rounder than in the last specimens. Just such a form of the occipital region is represented in Nos. 1278, 1282, 1365, and 1366. Nos. 13, 30, 75, 77, 84, 85, 86, 87, 93, 95, 97, 446, and many others, are asymmetrical skulls, flattened behind in a manner more or less like one or other of the forms represented in plates 8, 11, and 11 B, of *Crania Americana*. In other skulls of this great Toltec group, the occipital flatness is almost vertical, and at the same time symmetrical, as above intimated. The superiorly flattened or shelving occiput is seen in some of the Peruvian skulls, as in Nos. 571, 631, and others. No. 696 has an occipital region very much like that figured in Vimont’s Atlas, plate 96, fig. 2; while Nos. 1420, 1425, and all the casts of skulls found on the Island of Titicaca, resemble, in the conformation of the occiput, the cranium represented in Table 1 of Fitzinger’s *Essay Ueber die Schädel der Avaren*.

The skulls of Aymaras, from Bolivia and Peru, figured by D’Orbigny, have projecting occiputs.*

The Mexican crania in the Academy’s collection differ from each other in the form of the occipital region.

A female skull (34), of this great family, obtained from Acapacingo, in the Valley of Cuernavaca, about fifty miles south of the City of Mexico, and regarded by Morton as belonging to the Tlahuican nation, exhibits an occiput moderately full and somewhat flattened above the slightly protuberant occipital boss. Two ancient Mexican crania (734, 735), exhumed near the Indian village of Guahapan, on the Mountain Popocatepetl, and perhaps of Aztec origin, differ in the shape of the hind head. No. 734 is asymmetrical, the right half of the occiput being flattened and pressed forward, while the left is undisturbed. The hind-head, as a whole, however, is full; and were it not for the lateral flattening, might be regarded as rounded, or even almost globular. In 735, on the other hand, the hind-head is narrower, and owing

* L’Homme Americain. Atlas.

to the strong development of the occipital protuberance, quite prominent, and somewhat shelving from above downwards and backwards. Two skulls (714, 715), from an ancient Mexican cemetery, at Otumba, have full, and more or less rounded occiputs. In another skull from Otumba (716), the hind-head is much more protuberant. (See *Crania Americana*, plates 59, 60, and 61.) In three crania (717, 718, and 720) from an ancient tomb at Tacuba, the hind-head is high, broad at the base, and the whole occipital bone prominent. The general form of the occipital region is shown in the outline wood-cut at the bottom of p. 233 of *Crania Americana*. Two Otomie crania (1323 and 1000), possess the same form of occiput. Three other Otomie skulls (1001, 1002, and 1003), have the hind-head elongated and shelving, and the occipital protuberance projecting very much. A short Tlascalan skull (1004), has a full and globular occiput. In the cranium of the Chechemecan female (1005), from a mound at Tezcuco, the occiput is more like that of Nos. 1001, 1002, and 1003 of the Otomie group. No. 1226, in the collection of the Academy, is the skull of a Mexican, from the cemetery of Santiago de Tlatilolco, near the City of Mexico. In this cemetery, many thousands of the natives were interred after the brave defence of their city against Cortes. It is probable, therefore that the individual to whom the skull belonged, stood up manfully in resistance to Spanish aggression. The hind-head is broad and very much flattened in the posterior, parietal and upper occipital portions. The well-marked transverse ridge forms a prominent dividing angle between the superior and inferior portions of the os occipitis. The occiput of the two Pames skulls (681, 1313), from San Lorenzo, near the City of Mexico, is much like that of 1323 and 1000 of the Otomie group. In the skull of an ancient Mexican chief (1314) exhumed together with various aboriginal arms and utensils, from the Cerro de Quetsilas, near the City of Mexico, the occiput is of a peculiar form. It is broad, but has very little vertical diameter, owing to the flatness of the crown. The whole head looks as if it had been compressed between two opposing forces, one applied at the top and the other at the base of the cranium. In No. 682 the occipital region is flat, very high, and comparatively narrow. Owing to the parallelism of the two sides, it is oblong from above downwards. No. 234, said to be taken from the great Altar of Sacrifices, at Mexico, is remarkably flattened behind, and chiefly to the right of the median line. The occiput of 1353 is singularly distorted. A broad and deep sulcus or fissure extends in the median line, from a little before the coronal suture, entirely back to the foramen magnum, dividing the whole calvaria into two lobes. The occiput in 1566 is full and rounded. Of the two Lipan skulls, No. 1345 has a full and regularly rounded occiput; No. 1346 a longer and more protuberant one. The remainder of the Mexican crania enumerated in the catalogue, from 1515 to 689, have full, and more or less protuberant occiputs.

No. 722, from the battle field of San Jacinto, in Texas, exhibits a very peculiar form.

Some time ago, Dr. E. H. Abaddie, of the United States Army, presented to the Academy a series of six crania procured in New Mexico. These skulls are of considerable interest. Two of them, Nos. 1032 and 1033, were obtained from the ruins of Gran Quivira, New Mexico, by Major Carleton, who explored the ruins thoroughly. No. 1034 was disinterred by Dr. Abaddie, from the centre of the ruins of the church at Guarra, New Mexico. No. 931, a fragmentary skull, was found, with many other human remains, in a very bad state of preservation, in making excavations in an old field in Santa Fe, New Mexico. "This head," writes Dr. Abaddie, "and the accompanying remains, evidently belonged to the same race of Indians which formed the numerous population of the large towns, long since in ruins, and of which so little is known, as Gran Quivira, Abo, Guarra, Pecos, Old Church, &c."

All these heads are brachycephalic, and in all of them the occiput is more

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or less flattened. No. 1032 exhibits a perpendicular or wall-like flatness of the hind-head. Nos. 1034 and 931 are asymmetrical. In the first the occiput is flattened, chiefly to the right of the median line; in the other mainly to the left. No. 930, the skull of a Puéblo Indian, taken from the church-yard of the village of Laguna, and 1035, the skull of Jose Largo, a Mescalero chief, who was killed in an affray near Bosque Redondo, not far from the Pecos river, New Mexico, are both dolichocephalic heads. The occiput of the first is shelving; that of the second, rounded.

The Academy's collection contains three other New Mexican heads, which were procured and forwarded by Mr. Geo. Gibbs to Dr. J. H. B. McClellan, who placed them in the Museum of the Academy. One, of them (No. 935), is the skull of a chief of the Mogoyon Apache Indians, who was killed by the Navajó Indians, in a little ravine leading up the side of the Mesa de los Lobos, to the right of the Fort Defiance road, and at the head of Canon del Gallo, New Mexico. The occiput of this skull is prominent, and somewhat inclined from above downwards and backwards. No. 936 is the skull of a Navajó* Indian, picked up on the road leading from Albuquerque to Fort Defiance, at a place called the "Lake," situated on the Pacific slope of the Rocky Mountains, six miles from the summit. In the cranium, the occipital region is flatly round. No. 937, the skull of a Puéblo† Indian, of Laguna, New Mexico, possesses a vertically flattened occiput.

The negro crania in the Museum of the Academy exhibit a remarkable agreement in the shape of the occipital region. Of the group marked "American born," in the Catalogue, Nos. 1, 2, 69, 74, 421, 548, 1301, 1302, 1318, 1320, 235, and 236, are all oblong heads, with prominent, and more or less shelving occiputs. In Nos. 74 and 548 the basal portion of the occipital bone is very much compressed or flattened, like some of the Malay skulls. Nos. 549, 900, and 984 of this group have the occiputs more or less rounded. With the exception of Nos. 580, 1098, and 1101, in which the occiput is flattened at the base, and No. 1093, the occipital region of which is full and rounded, all the skulls of the native African group in the collection are long heads with prominent occiputs, which in form are sometimes shelving or inclined, sometimes oval, and occasionally narrow, and somewhat acuminate. The same statement applies in great measure to the two Hovah, and all the Australian skulls in the collection. No. 435, an Oceanic negro, is a short head, with the occiput inferiorly flattened. No. 1343, a Tasmanian from Van Diemen's Land, has a protuberant occipital region.

In table 6, 7, and 8 of Blumenbach's *Decades Craniorum*, the protuberant occiput of the negro is very well shown. In tables 17, 18, and 19, the form varies in several respects. The normal form of the negro occiput, and that to which the great majority of the African skulls in the Academy's collection conforms, is well illustrated in plates 2 and 3 of Prof. Van der Hoeven's valuable treatise entitled "Bijdragen tot de Natuurlijke Geschiedenis van den Negerstam." The protuberant occiput of the Ethiopian is also exhibited in

* "This tribe," writes a valued correspondent, Mr. Geo. Gibbs, "is said to number 1,200 souls, and to be a decidedly pastoral people, having in their possession at the present time (July, 1857), 60,000 horses, and 350,000 sheep. They can bring 2500 warriors into the field at one time. Their skulls are exceedingly difficult to procure, on account of their habit of stowing the dead away in hidden places."

† "These Indians," says Mr. Gibbs, "get their name from the Spanish word *puéblo*, because they live in little towns or villages, cultivating the soil in the neighborhood of the same. It is said that New Mexico boasts of twenty-seven of these *puéblos* at the present time, differing in population from 40 to 2,500 souls. Some of the principal *puéblos* are named Puéblo of Taos, Zuni, Laguna, San Felipe, Santa Domingo, Sandia, Isleta, and Acoma. With but few exceptions, the inhabitants speak different languages, though all of them use the Spanish. Nominally they are Catholics, having chapels in their midst, yet they continue to worship Montezuma (whom they believe to be residing in the sun), day and night, by means of never ceasing religious dances."

table 7 of Dr. Lucae's "Organischen Formenlehre," a work containing many interesting craniographic details.

From the foregoing facts we may conclude :—

1. That the form of the human occiput is not constant. On the contrary, it varies continually in the different races and tribes of men. It varies, also, to a greater or less extent, among the individuals of the same race or tribe.

2. That the different occipital forms may be divided into five classes or groups, which are reducible, however, to three. These are, 1st. The protuberant or prominent occiput, with the upper or parietal half somewhat flattened, so as to present an inclined or shelving appearance. (See p. 399.) 2d. The vertically flattened. 3d. The inferiorly flattened or compressed, in which the basal portion of the occiput slants upwards and backwards, as is shown in a strongly marked degree, in the Sandwich Islander head, fig. 69, on page 340 of "Indigenous Races of the Earth." 4th. The round. And 5th. The globular. As the last two merge more or less into each other, and as the third form may be regarded as, in many instances, a modification of the second, these five forms may, with greater simplicity, be thrown into three groups, viz. :—1st. The prominent and oval, or superiorly inclined. 2d. The perpendicularly flattened. And 3d. The more or less round or globular.

3. That to the first of these groups belong the Norwegians, Swedes, and some other Scandinavians; the Frisians and Batavians,* among the low Germans; the Anglo-Saxons and Anglo-Americans, the form of the occiput in these being between that of the Swedes and Germans; the Celtic Irish, and some tribes of the ancient Britons; the Phœnicians, Circassians, Armenians, Affghans, Baluchi; some of the Egyptians and Arabs, the Fellahs, Abyssinians, and Guanchés of the Canary Isles; some of the Hindoos and Chinese; the Loo-Chooans, certain Malays; the Eskimos, Kamtschatskans, Reindeer Tungus, Icelanders, Tehuktchi, Unalaschkans, some of the Kanakas, Tahitians, and others of the Sandwich Islands, Marquesans, of Nukahivah, New Zealanders, Feejeeans, and most of the African tribes. Among the aboriginal Americans, this form is exhibited by the Arickarees, Assinaboins, Cherokees, Chippeways; some of the Kootenays, Creeks, and Dacotas; by the Hurons, and probably the Illinois; by some of the Iroquois and most of the Lenapes; by the Mandans, Minetaris, Menominees, Miamis, Mohawks, and most of the Narragansetts, the Naticks, some of the Osages, Ottawatomies, Pawnees, and Sauks; by most of the Seminoles, by the Shawnees, Shoshone, Upsarookas, Californians, Cayugas, Cheyennes, Choctaws, Massasaugas, Mingos, Naumkeags, Mayas of Central America; by some of the Araucanians, the Charibs, Patagonians, Brazilians, Aymaras, and by some of the ancient Mound Builders, Peruvians, and Mexicans.

In the kumbekephalic variety of skulls, this form of occiput is often very much exaggerated, as is seen in certain ancient Cimbrian, Ostrogoth, and Burgundian heads; in some Egyptians and Celtic Irish, and in one Creek Indian skull.

4. That of the second form of occiput, or that in which the hind-head is more or less vertically flattened, we find examples in some of the ancient inhabitants of Scandinavia; the Lapps, Samoiedes, Iberians, or Basques of the Pyrenees; the ancient Pelasgi; Cossacks, Hungarians, Candaharians, some Arabs; one Chinese, the Siamese, some Malays and Javanese; certain tribes of the Transgangetic, or Indo-Chinese Peninsula, and occasionally among the Tahitians. To this group belong, also, the skulls of Chetimache, Natchez, Otoo, Kennehawha, Oneida, Seneca, and Puelche Indians; likewise a portion of the Kootenays, Lenapes, Miamis, Osages, Ottawas, Pottawatomies, Shoshones, Araucanians, Peruvians, and the majority of the Mound Builders.

Examples of the inferiorly flattened modification of, or deviation from this type, are found in some of the Malays, Polynesians, &c.

* See Catalogus Craniorum Diversarum Gentium quæ Collegit, J. Van der Hoeven, p. 14.

5. That the third form, in which the occiput is full and rounded, or globular, comprises the Danes, Finns, Esthonians; the short-headed Germans, whose crania, in general conformation, occupy a place between those of the Swedes and Finns; the Dutch, some tribes of the ancient Britons; the Slaves, Turks, Greeks, Romans, Etruscans, Persians, ancient Assyrians, some of the Egyptians, Hebrews, Copts, Hindoos; some of the Chinese, Japanese, Burmese, Malays; the Kalmucks, Burats, and some of the Kanakas. To this group belong, of the American Indians, the Ottigamies, Penobscots, Winnebagoes, Yamasees, Chemasyans, Euchees, Nanticokes, Pocassetts, Quinpiacks, or Mohegans, and a portion of the Cheyennes, Creeks, Dacotas, Iroquois, Narragansetts, Pawnees, Pottawatomies, Sauks, Seminoles, Araucanians, Peruvians, and Mound Builders.

6. That the shelving or oval form of the occiput is most common in the dolichocephalic heads, and as these predominate in number over the brachycephalic, it is the most common form of all. Next comes the round or globular, and lastly the vertically flat—both these forms prevailing in the brachycephalæ.

7. That there is a marked tendency of these forms to graduate into each other, more or less insensibly. None of these forms can be said to belong exclusively to any race or tribe. None of them, therefore, can be regarded as strictly typical, for, a character or form, to be truly typical, should be exclusive and constant.

Dr. Fisher announced the death of A. M. C. Duméril, a correspondent of the Academy, at Paris.

October 2nd.

Mr. LEA, President, in the Chair.

Forty members present.

The following papers were presented for publication:

"Descriptions of New Corals in the Museum of the Academy of Natural Sciences, by George H. Horn."

"The Reptilia of the North Pacific Exploring Expedition, Capts. Ringgold and Rodgers, mostly collected by William Stimpson, by Edward Hallowell, M. D., edited by Edward D. Cope."

"Systematic Catalogue, with Synonymy, &c., of Jurassic, Cretaceous and Tertiary Fossils, collected in Nebraska, by the Exploring Expeditions under the command of Lieut. G. K. Warren, of the U. S. Topog. Engineers, by F. B. Meek and F. V. Hayden, M. D."

"Catalogue of Carboniferous Plants in the Museum of the Academy of Natural Sciences, with corrections in synonymy, descriptions of new species, &c., by Horatio C. Wood, Jr."

"New Unionidæ of the United States and Northern Mexico, by Isaac Lea."

And were referred to Committees.

Mr. Cassin offered the following resolutions, which were adopted:

Resolved, That the thanks of the Academy be presented to Mrs. Peter A. Browne, for the interesting and valuable collection of the hair of man, and of inferior animals, made by her late husband, an esteemed member of this Academy, and presented by her this evening.

Resolved, That the right of giving orders for admission, and of endorsing tickets of admission to the Museum of this Academy on public days, be 1860.]